



*Norwegian
Meteorological Institute*
met.no MSC-W

EMEP/MSC-W model: Computational requirements

Peter Wind



Basic requirements:

- Linux computer (Fedora, ubuntu, ...)
- Fortran (95) compiler (ifort (Intel), gfortran (Gnu),...)
- MPI library (OpenMPI,...)
- NetCDF library (preferably version 4 or later)
- 2-4 GB memory, 30 GB disk space
⇒ In practice any linux PC will do!



Requirement details:

Compilation: use 8 bytes reals

- ifort -r8
 - gfortran -fdefault-real-8
-
- Netcdf: by default uses compressed output (i.e. Netcdf4/hdf5). This can be switched off (in configuration file put NETCDF_COMPRESS_OUTPUT=F)



Input data, an essential part of the model:

- Meteorology
- Emissions (many types)
- Landuse

Except for meteorology, all other input data can be set to a default value. The data will be interpolated to the required grid.



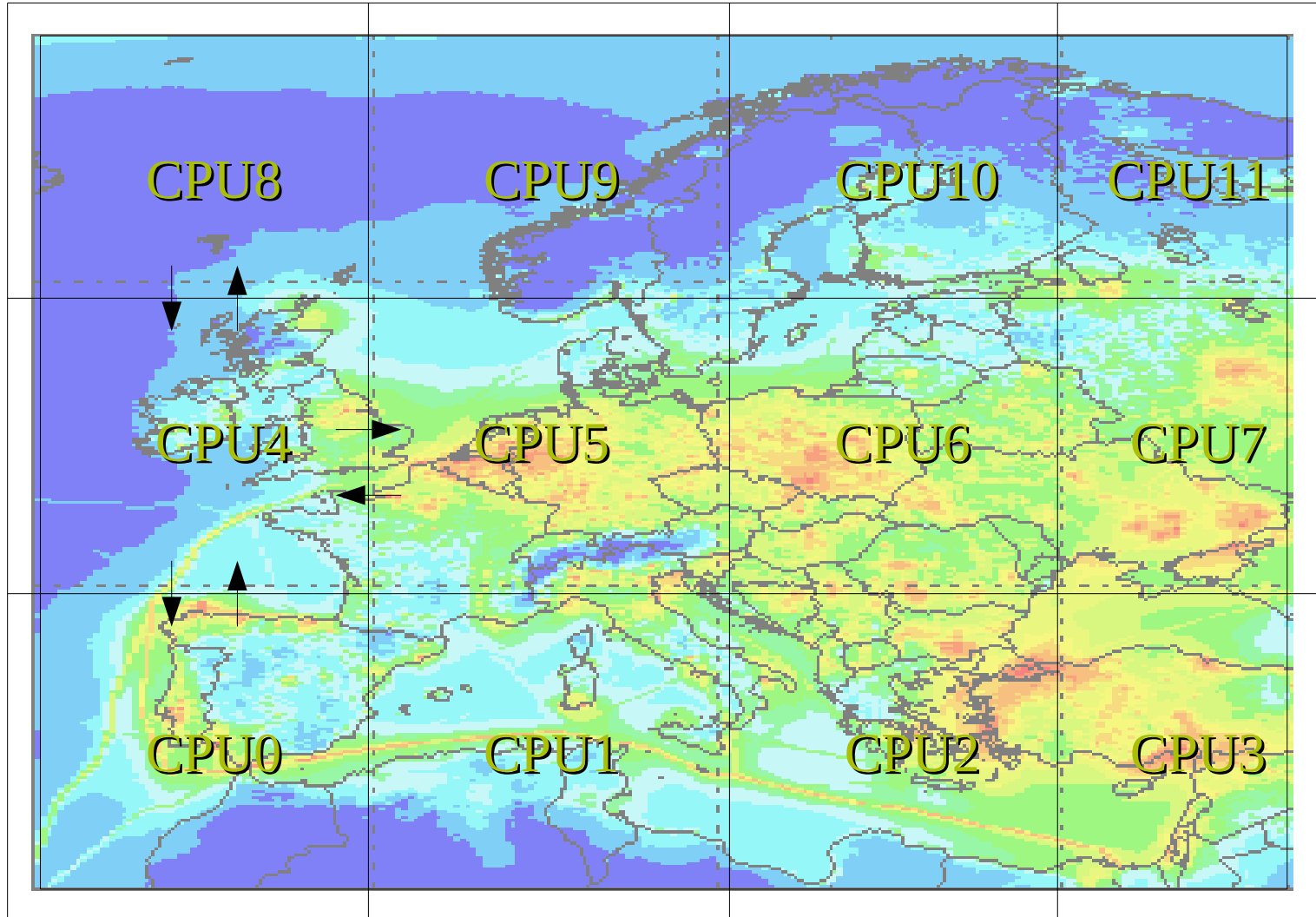
Parallelization:

- One processor does the computation for one geographical rectangle.
- The processors are exchanging information using MPI
- Communication is only required for Input/Output and advection
- For large grids, the model scales to over 1000 processors

Example 12 processors



CPU4 communicates with CPU 0, 5 and 8



How long time take a run:



- Typically one year simulation for EMEP grid (132x111) on 64 CPU, takes 2.3 hours.
- For large grids, the model scales to over 1000 processors
- Time will increase with:
 - Larger grid
 - Fewer processors
 - Finer resolution
 - Large output (3D, hourly...)
- 60% chemistry, 20% advection, 20% I/O + communication