Run WRF/ARW

You have these choices in **`WRFV3/test/`**

(made at compile time):

NMM

- **`nmm_real`**
- **`em_real`**

} 3d real-data

ARW

- **`em_quarter_ss`**
- **`em_b_wave`**
- **`em_les`**
- **`em_heldsuarez`**

} 3d ideal

- **`em_hill2d_x`**
- **`em_squall2d_x`**
- **`em_squall2d_y`**
- **`em_grav2d_x`**
- **`em_seabreeze2d_x`**

} 2d ideal

Steps to Run

1. cd to run/ or one of the test case directories.
2. Link or copy WPS output files to the directory for real-data cases.
3. Edit namelist.input file for the appropriate grid and times of the case.
4. Run initialization program (ideal.exe, real.exe, or real_nmm.exe).
5. Run model executable, wrf.exe.

WRFV3/run directory

README.namelist
LANDUSE.TBL
ETAMPNEW_DATA
GENPARM.TBL
RRTM_DATA
SOILPARM.TBL
VEGPARM.TBL
urban_param.tbl
tr49t67
tr49t85
tr67t85
gribmap.txt
grib2map.tbl

these files are model physics data files: they are used to either initialize physics variables, or make physics computation more efficient

…. (a few more)

namelist.input -> ../test/*em_real*/*namelist.input*
real.exe -> ../main/real.exe
wrf.exe -> ../main/wrf.exe
ndown.exe -> ../main/ndown.exe

Running ARW Real-Data Case

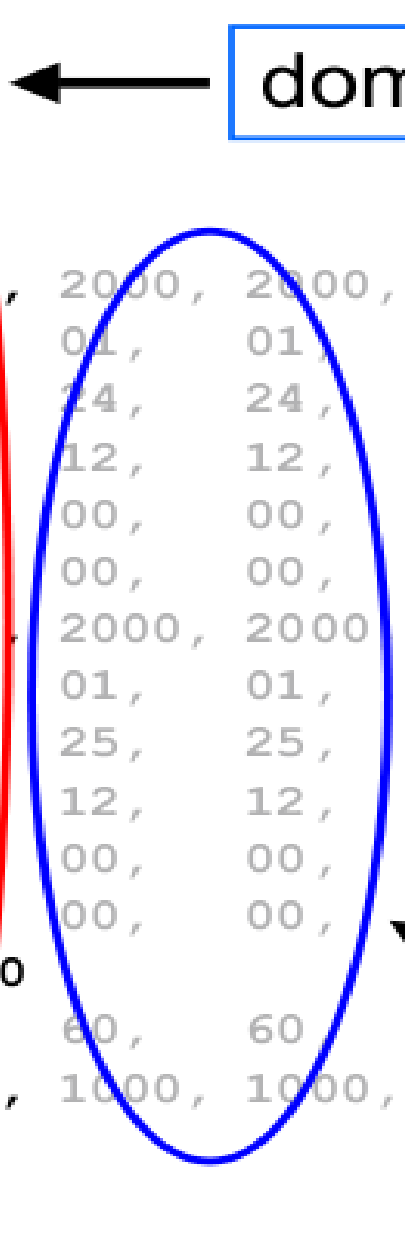
- One must successfully run WPS, and create met_em.* file for more than one time period
- Link or copy WPS output files to the run Directory: ln -s ../../../WPS/met_em.d01.* .
- Edit namelist.input file for runtime options (at mininum, one must edit &time_control for start, end and integration times, and &domains for grid dimensions).
- Run the real-data initialization program: ./real.exe
- Successfully running this program will create model initial and boundary files: wrfinput_d01 and wrfbdy_d01.
- Run the model executable by typing: ./wrf.exe
- Successfully running the model will a create model history file: wrfout_d01_2005-08-28_00:00:00

Basic namelist Options

- WRF model running is mainly controlled by a namelist file. Therefore, understanding the content of this file is CRITICAL.
- Namelist file: A Fortran namelist contains a list of runtime options for the code to read in during its execution. Use of a namelist allows one to change runtime configuration without the need to recompile the source code.
- Fortran 90 namelist has very specific format, so edit with care: &namelist-record - start
  / - end
- There are totally eight (8) sections in WRF model namelist file: *time_control*, *domains*, *physics*, *fdda*, *dynamics*, *bdy_control*, *grib2*, and *namelist_quilt*
- General rule: Multiple columns: domain dependent;
  Single column: value valid for all domains.

&time_control

```
run_days                            = 0,
run_hours                           = 24,
run_minutes                         = 0,
run_seconds                         = 0,
start_year                          = 2000, 2000, 2000,
start_month                         = 01,   01,   01,
start_day                           = 24,   24,   24,
start_hour                          = 12,   12,   12,
start_minute                        = 00,   00,   00,
start_second                        = 00,   00,   00,
end_year                            = 2000, 2000, 2000,
end_month                           = 01,   01,   01,
end_day                             = 25,   25,   25,
end_hour                            = 12,   12,   12,
end_minute                          = 00,   00,   00,
end_second                          = 00,   00,   00,
interval_seconds                    = 21600
history_interval                    = 180,  60,   60,
frame_per_outfile                   = 1000, 1000, 1000,
restart_interval                    = 360,
```



domain 1 option

nest options

&time_control

- Interval_seconds: Time interval between WPS output times, and LBC update frequency
- history_interval: Time interval in minutes when a history output is written; The time stamp in a history file name is the time when the history file is first written, and multiple time periods may be written in one file. e.g. a history file for domain 1 that is first written for 1200 UTC Jan 24 2000 is

  wrfout_d01_2000-01-24_12:00:00
- frame_per_outfile: Number of history times written to one file.
- restart_interval: time interval in minutes when a restart file is written; By default, restart file is not written at hour 0; A restart file contains only one time level data, and its valid time is in its file name, e.g. a restart file for domain 1 that is valid for 0000 UTC Jan 25 2000 is wrfrst_d01_2000-01-25_00:00:00

&time_control

```
io_form_history      = 2,
io_form_restart      = 2,
io_form_input        = 2,
io_form_boundary     = 2,
debug_level          = 0,
```

IO format options:
- = 1, binary
- = 2, netcdf (most common)
- = 4, PHDF5
- = 5, Grib 1
- =10, Grib 2

`io_form_restart = 102` : write in patch sizes: fast for large grids and useful for restart file

Debug print control: Increasing values give more prints.

&domains

```
time_step                           = 180
time_step_fract_num                 = 0,
time_step_fract_den                 = 1,
max_dom                             = 1,
s_we                                = 1,     1,     1,
e_we                                = 74,    112,   94,
s_sn                                = 1,     1,     1,
e_sn                                = 61,    97,    91,
s_vert                              = 1,     1,     1,
e_vert                              = 28,    28,    28,
num_metgrid_levels                  = 21
dx                                  = 30000, 10000, 3333,
dy                                  = 30000, 10000, 3333,
eta_levels                          = 1.0,0.996,0.99,0.98,… 0.0
p_top_requested                     = 5000,
```

nest options

&domains

- time_step, time_step_fract_num, time_step_frac_den: time step for model integration in seconds; fractional time step specified in separate integers of numerator and denominator; ARW: 6 x DX, DX is grid distance in km.
- s_we, s_sn, s_vert: starting indices in X, Y, and Z direction; 1 for domain 1.
- e_we, e_sn, e_vert: model grid dimensions (staggered) in X, Y and Z directions.
- num_metgrid_levels: number of metgrid (input) data levels.
- dx, dy: grid distances in meters.
- p_top_requested: pressure value at the model top; constrained by the available data from WPS; default is 5000 hPa.
- eta_levels: specify your own model levels from 1.0 to 0.0; if not specified, program real will calculate a set of levels for you.