How to SET UP and RUN WRF-NMM

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Outline

- How to get, configure, compile and run WRF-NMM code?
- Input and output files
- WRF-NMM namelist
- Check output

How to get, configure and compile WRF-NMM?

- Get WRF source code from *http://www.dtcenter.org/wrf-nmm/users/downloads/index.php*
- The WRF-NMM core is given inside: ***wrfv2.1.2.tar.gz***
- After **gunzip** and **untar**, should see a directory **WRFV2/**
- cd to **WRFV2/** directory

Makefile	**Top-level makefile**
README	**General information about WRF code**
README.NMM	**NMM specific information**
README_test_cases	**Explanation of the test cases for WRF-ARW**
Registry/	**Directory for WRF Registry file**
arch/	**Directory where compile options are gathered**
chem/	**Directory for chemistry modules**
clean	**script to clean created files and executables**
compile	**script for compiling WRF code**
configure	**script to configure the configure.wrf file for compile**
dyn_em	**Directory for WRF-ARW dynamic modules**
dyn_exp/	**Directory for a 'toy' dynamic core**
dyn_nmm/	**Directory for WRF-NMM dynamic modules**
external/	**Directory that contains external packages, such as those for IO, time keeping and MPI**
frame/	**Directory that contains modules for WRF framework**
inc/	**Directory that contains include files**
main/	**Directory for main routines, such as wrf.F, and all executables**
phys/	**Directory for all physics modules**
run/	**Directory where one may run WRF**
share/	**Directory that contains mostly modules for WRF mediation layer and WRF I/O**
test/	**Directory containing sub-directories where one may run specific configurations of WRF. test case Only *nmm_real* is relevant to WRF-NMM**
tools/	**Directory that contains tools**

How to configure?

Set **NETCDF** enviromental variable**:**

Example: ***setenv NETCDF /usr/local/lib32/r4i4***

For LINUX, make sure the netCDF library is installed using the same compiler.

Example: ***setenv NETCDF /usr/local/netcdf-pgi***

To configure WRF, type:

./configure

List of Configure Options-1

Choices for LINUX operated machines are:

1. PC Linux i486 i586 i686, PGI compiler (Single-threaded, no nesting)
2. PC Linux i486 i586 i686, PGI compiler (Single threaded, supports nesting using RSL)
3. PC Linux i486 i586 i686, PGI compiler SM-Parallel (OpenMP, no nesting)
4. PC Linux i486 i586 i686, PGI compiler SM-Parallel (OpenMP, supports nesting using RSL without MPI)
5. PC Linux i486 i586 i686, PGI compiler DM-Parallel (RSL, MPICH, support nesting)
6. PC Linux i486 i586 i686, PGI compiler DM-Parallel (RSL_LITE, MPICH, No nesting)
7. Intel xeon i686 ia32 Xeon Linux, ifort compiler (Single-threaded, no nesting)
8. Intel xeon i686 ia32 Xeon Linux, ifort compiler (Single threaded, supports nesting using RSL without MPI)
9. Intel xeon i686 ia32 Xeon Linux, ifort compiler (OpenMP)
10. Intel xeon i686 ia32 Xeon Linux, ifort compiler SM-Parallel (OpenMP, supports nesting using RSL without MPI)
11. Intel xeon i686 ia32 Xeon Linux, ifort compiler DM-Parallel (RSL, MPICH, with nesting)

For WRF-NMM V2, it is recommended to select 6.

List of Configure Options-2

Choices for IBM machines are:

1. AIX (single-threaded, no nesting)
2. AIX SM (OpenMP, no nesting)
3. AIX DM-Parallel (RSL_LITE, IBM-MPI, no nesting)
4. AIX DM-Parallel (RSL, IBM-MPI, supports nesting)
5. AIX DM-Parallel (RSL, IBM-MPI, supports nesting) (PARALLEL HDF5)
6. AIX DM-Parallel (RSL_LITE, IBM-MPI, no nesting) (PARALLEL HDF5)
7. AIX DM-Parallel/SM-Parallel (RSL, IBM-MPI, OpenMP, supports nesting)
8. AIX DM-Parallel (RSL, IBM-MPI, supports nesting, moving nests, experimental!)
9. AIX DM-Parallel (RSL, IBM-MPI, MCEL, experimental!)
10. AIX DM-Parallel ESMF (RSL, IBM-MPI, ESMF coupling, supports nesting, experimental!)
11. AIX DM-Parallel ESMF (RSL, IBM-MPI, ESMF coupling and LogErr, supports nesting, experimental!)
12. AIX (Single-threaded, nesting using RSL without MPI)
13. AIX (OpenMP, nesting using RSL without MPI)

For WRF-NMM V2, it is recommended to select 3.

How to configure?

- Command will create a file called ***configure.wrf***. This file can be edited to change compile options, if desired.
- Note also that WRF V2.1.2 compile options are provided for a number of platforms. The ***arch/configure.defaults*** file can be edited to add a new option.

How to compile?

- First set WRF_NMM_CORE environmental variable to 1:

  setenv WRF_NMM_CORE 1

- Type the following command to compile:

  ./compile nmm_real

- If the compilation is successful, it will create two executables in the **main/** directory: ***real_nmm.exe*** and ***wrf.exe***
  - ✓ ***real_nmm.exe***: used for WRF-NMM initialization of real data cases.
  - ✓ ***wrf.exe***: used for WRF-NMM model integration.
- These executables will be linked to ***test/nmm_real*** and ***run***/ directories.

WRFV2/run directory

/run/LANDUSE.TBL
/run/ETAMPNEW_DATA
/run/RRTM_DATA
/run/SOILPARM.TBL
/run/VEGPARM.TBL
/run/tr49t67
/run/tr49t85
/run/tr67t85
/run/namelist.input ➔ ***Needs to be edited***
/run/real_nmm.exe -> ../main/real_nmm.exe
/run/wrf.exe -> ../main/wrf.exe

Note that the above listed items are listed also in /test/nmm_real/ directory

- Before running ***real_nmm.exe*** and ***wrf.exe***, edit ***namelist.input*** file for runtime options.

  *(Explained in detail in the **"namlist.input"** presentation.)*

- A complete list of the namelist variables/parameters and their explanations can be found in the WRF-NMM User's Guide (Chapter 5).

How to run ***real_nmm.exe***?

1. Edit the ***namelist.input*** file in /WRFV2/test/nmm_real/
(See Description of Namelist Variables document for details.)

2. Make sure the below listed executables and files are linked to the working-directory.

   /WRFV2/run/: ***namelist.input, real_nmm.exe, wrf.exe***

   ETAMPNEW_DATA, RRTM_DATA, GENPARM.TBL, LANDUSE.TBL, SOILPARM.TBL, VEGPARM.TBL, gribmap.txt, tr49t67, tr49t85, tr67t85

   Give also link to:

   wrf_real_input_nm* (WRF-NMM SI results.)

How to run *real_nmm.exe*?

3. Depending on the operating system used, the following commands can be issued to run ***real_nmm.exe*** in the working directory:

On LINUX-MPI systems, the command is:

```
mpirun -np n real_nmm.exe
```

where **“n”** defines the number of processors to use. For single processor use 1.

On IBM systems, the command is:

```
poe real_nmm.exe
```

For interactive runs on IBMs, the command is:

```
poe real_nmm.exe -rmpool 1 -procs n
```

where ***“n”*** stands for number of processor (CPUs) to be used.

4. To see whether the run is successful: ***tail rsl.out.0000***

Search for: “SUCCESS COMPLETE REAL_NMM INIT”

5. If the ***real_nmm.exe*** run is successful, the following files should be found in the working-directory:

wrfinput_d01 (Initial conditions, single time level data)

wrfbdy_d01 (Boundary conditions data for multiple time steps)

How to run *wrf.exe*?

1. Depending on the operating system used, the following commands can be issued to run ***wrf.exe*** in the working directory:

On LINUX-MPI systems, the command is:

```
mpirun -np n wrf.exe
```

where **“n”** defines the number of processors to use. For single processor, use 1.

On IBM systems, the command is:

```
poe wrf.exe
```

For interactive runs on IBMs, the command is:

```
poe real_wrf.exe -rmpool 1 -procs n
```

where ***“n”*** stands for number of processor (CPUs) to be used.

2. To see whether the run is successful: ***tail rsl.out.0000***
Search for: “SUCCESS COMPLETE WRF”

3. If the ***wrf.exe*** run is successful, the following files should be found in the working-directory:

wrfout_d01_yyyy-mm-dd_hh:mm:ss

For example, if the model is started at 0000 UTC, 23 January 2005, then the first output file should be:

wrfout_d01_2005-01-23_00:00:00

4. It is possible to check the times written to the output file by typing:

ncdump -v Times wrfout_d01-2005-01-23_00:00:00

Output from an ***mpirun***

The standard-out and error will go into the following files for MPI runs: *domain-deposition info*

rsl.out.0000	***rsl.error.0000***
rsl.out.0001	***rsl.error.0001***
rsl.out.0002	***rsl.error.0002***
rsl.out.0003	***rsl.error.0003***

There are one pair of files for each running processor.

A Note for Registry.NMM

Registry.NMM has been modified to include parameter definitions and units. This version is not in the current release, but it shall be part of the next coming release (by September 2006?).

This file can be found in the Tutorial package:

WRFV2/Registry/Registry.NMM_with_notes

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