Script for UFS/SRW demonstration (Derecho version)
ATM419/563 Spring 2024

IMPORTANT: Log onto **derecho.hpc.ucar.edu** with your **NCAR login and password**. You will then need to authenticate with Duo. I suggest you open TWO separate sessions on derecho.

This demonstration uses the UFS Short Range Weather (SRW) application version 2.2.0. We will redo the WINDSTORM case at 25 km grid spacing.

Derecho help documents: https://arc.ucar.edu/docs

* -------------- preliminaries --- *
• move to your scratch space
$ cd /glade/derecho/scratch/$USER

• create new directory for the UFS SRW and move into it
$ mkdir UFS_SRW
$ cd UFS_SRW

• get the UFS SRW code from github. This is one single line:
$ git clone -b release/public-v2.2.0 https://github.com/ufs-community/ufs-srweather-app.git
        → this creates a new directory called "ufs-srweather-app"

• move into the new directory
$ cd ufs-srweather-app

• prepare for building code. This may take a few minutes. Output shown below
$ ./manage_externals/checkout_externals

Processing externals description file : Externals.cfg
Checking status of externals: ufs_utils, ufs-weather-model, upp, arl_nexus, aqm-utils, workflow-tools,
Checking out externals: aqm-utils, ufs_utils, upp, arl_nexus, ufs-weather-model, workflow-tools,

• build the code. You will have to hit the space bar to continue at some point. ***This takes time.***

$ ./devbuild.sh --platform=derecho

46   * ------------- **preparing a new simulation** -- *
47
48    $ source ./etc/lmod-setup.sh derecho
49    $ module use ./modulefiles
50    $ module load wflow_derecho
51
52   • The command above should respond with
53   Please do the following to activate conda: > conda activate workflow_tools
54
55    $ conda activate workflow_tools
56
57   • Henceforth your command prompt will contain "(workflow_tools)"
58   → *ssh, sftp, and scp will stop working in this session*
59
60   * ------------- **running the simulation** -- *
61   • move to the working directory
62    $ cd ush
63
64   • copy the "yaml" file that will drive the model (like namelist.input)
65    $ cp /glade/derecho/scratch/fovell/config.yaml .   *[remember space and dot]*
66
67   • launch the experiment
68    $ ./generate_FV3LAM_wflow.py
69
70   • this should result in output that looks like this
71
72   Experiment generation completed. The experiment directory is:
73
74   EXPTDIR='/glade/derecho/scratch/[yourlogon]/UFS_SRW/expt_dirs/ufs_srw_case_
75   windstorm'
76
77   * ------------- **monitoring the simulation** -- *
78   • the config.yaml file specifies the output directory to be **ufs_srw_case_windstorm**.
79   • this directory is created in UFS_SRW/expt_dirs. Move to it
80
81    $ cd ../../expt_dirs/ufs_srw_case_windstorm
82
83   • next command lists all of the many parts of the UFS workflow, and status of each
84   → **it may take several minutes for the xml file to be created**, so please be patient
85
86    $ rocotostat -w FV3LAM_wflow.xml -d FV3LAM_wflow.db -v 10
87
88   • this command summarizes the **job status**. You can reissue this command to check
89   on job status.
90    $ tail -n 40 log.launch_FV3LAM_wflow
91

92   → While modeling system is running, you'll see output like this
93
94   Summary of workflow status:
95   ~~~~~~~~~~~~~~~~~~~~~~~~~
96
97   0 out of 1 cycles completed.
98   Workflow status: **IN PROGRESS**
99
100 ==
101 End of output from script "launch_FV3LAM_wflow.sh".
102 ==
103
104 → we are looking for "SUCCESS"
105
106 Summary of workflow status:
107 ~~~~~~~~~~~~~~~~~~~~~~~~~
108
109   1 out of 1 cycles completed.
110   Workflow status: **SUCCESS**
111
112 * ------------- **outputs** -- *
113 • in expt_dirs/ufs_srw_case_windstorm/ output is placed in folder "**2021123012**"
114 • it will take awhile for this folder to be created and populated with outputs
115
116 → outputs named dynfNNN.nc contain prognostic fields on model levels
117 → outputs named phyfNNN.nc contain fields like 10m wind and 2m temperature
118 →   NNN = forecast hours
119 → outputs in GRIB2 format are in 2021123012/postprd
120
121 • make sure you are in the **2021123012/postprd** directory
122 $ module load eccodes
123
124 • combine isobaric GRIB2 files into a single file [simplifies handling]
125 $ grib_copy srw*prslev* ufs_example_combined.grib2
126
127 * ------------- **visualization** -- *
128 You can use Jupyterhub on NCAR resources or move your GRIB2 file back to Albany
129 for visualization.
130
131 **NCAR visualization**
132 → for NCAR, copy my notebook from my scratch directory to your home directory
133 $ cp /glade/derecho/scratch/fovell/GRIB_plot_example.ipynb ~/.
134   → the ~/ stands for your home directory
135
136 • Chrome or Firefox are preferred browsers. See https://arc.ucar.edu/docs for
137 more in-depth information.

138   Procedure:
139   (1) Go to jupyterhub.hpc.ucar.edu. Under "Available NCAR Resources" select the
140   "Production" button
141   (2) Log in with your NCAR username and password and then Duo authentication.
142   (3) "Add new server". Select "Casper logon" from the options when they appear.
143   (4) You'll start in your Derecho home directory. You should see
144   GRIB_plot_example.ipynb among your files. Launch as usual.
145   (5) Check Cell #3 for the **location** of your UFS run. Other things to check:
146   initiation_time [model start time] and timeindex [forecast hour you want to plot]
147
148   **Moving to Albany**
149   It is easiest to use scp or sftp to transfer the files to ash.atmos.albany.edu or
150   reed.atmos.albany.edu, into your home directory [if you have room]. From there,
151   you can scp them to your atm419lab space.
152   → DO THIS FROM YOUR SECOND DERECHO SESSION. *Executing the UFS python*
153   *environment causes ssh, sftp, scp to cease working*
154   → you can start with and modify $LAB/PLOTTING/GRIB_plot_example_V3.ipynb
155
156   *** ------------- future work --- ***
157
158   • A pre-configured yaml file to run at 6 km grid spacing in a spatially smaller domain
159   for 24 h from 2021123000 can be copied from
160   /glade/derecho/scratch/fovell/config.yaml.6km. Just rename it "config.yaml"
161   → consider renaming, moving, or removing your existing "ufs_srw_case_windstorm"
162   directory.
163
164   {Coureurs des UFS}