NCL on Yellowstone

Mary Haley  October 22, 2014
With consulting support from B.J. Smith
Main goals

• Demo two ways to run NCL in yellowstone environment

• Point you to useful documentation

• Sneak in some tips
Assumptions

• Account on yellowstone

• Yubikey or CRYPTOCard

• Familiar with basic UNIX commands

• Familiar with running NCL scripts
Websites I will mention

• CISL Home page
  http://www.cisl.ucar.edu

• NCL Home Page
  http://www.ncl.ucar.edu
# Two ways to run NCL scripts

<table>
<thead>
<tr>
<th>Running NCL interactively</th>
<th>Submitting an NCL job</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Login to yellowstone</td>
<td>• Login to yellowstone</td>
</tr>
<tr>
<td>• Open geyser terminal</td>
<td>• Submit an NCL job</td>
</tr>
<tr>
<td>• Run NCL</td>
<td></td>
</tr>
</tbody>
</table>
Yellowstone versus Geyser

• Yellowstone: use to submit data analysis jobs to geyser

• Yellowstone: use for quick, small jobs (< 15 minutes)

• Geyser: use for large data analysis jobs

• Should install “ssh keys” if using geyser

Go to CISL Home Page
Search on “install ssh keys”
Two ways to run NCL scripts

Running NCL interactively

• Login to yellowstone

• Open geyser terminal

• Run NCL

Submitting an NCL job

• Login to yellowstone

• Submit an NCL job
Login to yellowstone
(Linux, Mac, Cygwin)

ssh -X yellowstone.ucar.edu

May need -Y (especially Mac users):

ssh -Y yellowstone.ucar.edu

May need **username**:

ssh -Y haley@yellowstone.ucar.edu
Login to yellowstone (Windows)

Use “putty” application

Be sure to check “Enable X11 forwarding” box
Demo: Login to yellowstone (On a Mac)
Open geyser terminal

• Can’t login to geyser directly

• Must “submit a job” to open terminal
  
  bsub -Is -q geyser -W 6:00 -n 1 -P ### $SHELL

• Tip: use “execgy” command

• Reminder: install “SSH keys” to avoid password prompt
Demo: open geyser terminal
Questions?

More info:
Enter “yellowstone logging in”
or “using geyser”
in search window on CISL Home Page
Detour: “module” command

- Customize software environment
- NCL module not loaded by default
- Use to change versions of software
- Most helpful commands:

  module list  module load
  module av    module save
Demo: module command

Use

module save

to save current environment.

Better than editing .profile or .tcshrc file

To remove a package:

module rm ncl

module save
Questions?

More info:
Search “environment module” on CISL Home Page
Running NCL on geyser

• Run NCL the way you normally do
• Useful for developing/debugging NCL scripts
• Won’t time you out as quickly
Demo: Running NCL on geyser

Directory:
/glade/u/sampledata/ncl/CESM/CAM5/

NetCDF file:
ts_Amon_CESM1-CAM5_historical_r1i1p1_185001-200512.nc

NCL script:
contour_ts_color.ncl
Questions?

More info:
Search “geyser interactive applications” on CISL Home Page
Two ways to run NCL scripts

**Running NCL interactively**
- Login to yellowstone
- Open geyser terminal
- Run NCL

**Submitting an NCL job**
- Login to yellowstone
- Submit an NCL job
Submit an NCL job

- Do this from yellowstone
- Use the “bsub” command again
  
  \texttt{bsub < myjob.lsf}

- “myjob.lsf” is a file with “#BSUB” commands
- Two files created: \texttt{jobname.idnum.out} \texttt{jobname.idnum.err}
#!/bin/tcsh
#
# LSF batch script to submit an NCL script to geyser
#
#BSUB -P project_code       # project code
#BSUB -W 00:10              # wall-clock time (hrs:mins)
#BSUB -n 1                  # number of tasks in job
#BSUB -J anim               # job name
#BSUB -o anim.%J.out        # output file name, %J will be job ID
#BSUB -e anim.%J.err        # error file name, %J will be job ID
#BSUB -q geyser             # queue name

source /glade/u/apps/opt/lmod/4.2.1/init/tcsh

# “module” line only needed if not already loading ncl module.
# Useful for loading different version of NCL.
# module load ncl/6.1.2
module load ncl

# Execute the NCL script
ncl contour_ts_anim.ncl
BSUB sample scripts

Search “lsf examples”
or “ncl yellowstone bsub”
on CISL Home Page
Demo: submit NCL job

Directory:
/glade/u/sampledata/ncl/CESM/CAM5/

NetCDF file:
ts_Amon_CESM1-CAM5_historical_r1i1p1_185001-200512.nc

NCL script:
contour_ts_anim.ncl

BSUB script:
amim_script.bsub
Successful bsub job report

Sender: LSF System <lsfadmin@geyser15-ib>
Subject: Job 978055: <animjob> in cluster <yellowstone> Done
Job <animjob> was submitted from host <geyser15-ib> by user <haley> in cluster <yellowstone>.

.glade/u/home/haley> was used as the home directory.
.glade/scratch/haley/ncl_demo> was used as the working directory.
Started at Sun Oct 19 15:08:45 2014
Results reported at Sun Oct 19 15:12:39 2014

# LSBATCH: User input
#!/bin/tcsh
#
# LSF batch script to run an NCL script
#
#BSUB -P P39410000       # project code
#BSUB -W 02:00            # wall-clock time (hrs:mins)
#BSUB -n 1                # number of tasks in job
#BSUB -J animjob          # job name
#BSUB -o animjob.%J.out    # output file name in which %J is replaced by the job ID
#BSUB -e animjob.%J.err    # error file name in which %J is replaced by the job ID
#BSUB -q geyser           # queue

source /glade/u/apps/opt/lmod/4.2.1/init/tcsh
module load ncl/6.2.1
ncl contour_ts_anim.ncl
scp contour_ts_animation.gif cis1-denton.scd.ucar.edu:

Successfully completed.

Resource usage summary:
  CPU time : 229.16 sec.
  Max Memory : 1595 MB
  Average Memory : 900.62 MB
  Total Requested Memory :
  Delta Memory :
  (Delta: the difference between total requested memory and actual max usage.)
  Max Processes : 6
  Max Threads : 7

The output (if any) is above this job summary.

PS: Read file <animjob.978055.err> for stderr output of this job.
Unsuccessful bsub job report

---

Sender: LSF System <lsfadmin@geyser15.ib>
Subject: Job 978055: <animjob> in cluster <yellowstone> Done
Job <animjob> was submitted from host <geyser15.ib> by user <haley> in cluster <yellowstone>.

...<glade/u/home/haley> was used as the home directory.
</glade/scratch/haley/ncl_demo> was used as the working directory.
Started at Sun Oct 19 15:08:45 2014
Results reported at Sun Oct 19 15:12:39 2014

...# LSBATCH: User input
#!/bin/tcsh
#
# LSF batch script to run an NCL script
#
#BSUB -P P39410000       # project code
#BSUB -W 02:00            # wall-clock time (hrs:mins)
#BSUB -n 1                # number of tasks in job
#BSUB -J animjob          # job name
#BSUB -o animjob.%J.out   # output file name in which %J is replaced by the job ID
#BSUB -e animjob.%J.err   # error file name in which %J is replaced by the job ID
#BSUB -q geyser           # queue

source /glade/u/apps/opt/lmod/4.2.1/init/tcsh
module load ncl/6.2.1
ncl contour_ts_anim.ncl
scp contour_ts_animation.gif cisl-denton.scd.ucar.edu:

---

TERM_RUNLIMIT: job killed after reaching LSF run time limit.
Exited with exit code 140.

Resource usage summary:

    CPU time :  71.41 sec.
Max Memory :  699 MB
Average Memory :  471.00 MB
Total Requested Memory :
Delta Memory :
(Delta: the difference between total requested memory and actual max usage.)
Max Processes :  4
Max Threads :  5

Read file <animjob.978145.out> for stdout output of this job.
Read file <animjob.978145.err> for stderr output of this job.
Questions?

More info:
Search “ncl yellowstone”
on CISL Home Page
Customizing NCL environment

• UNIX editor enhancements

• “.hluresfile”
In review

**Running NCL interactively**

1. Login to yellowstone
2. Open geyser terminal
3. Run NCL

   1. ssh –Y yellowstone.ucar.edu
   2. execgy
   3. ncl myscript.ncl

**Submitting an NCL job**

1. Login to yellowstone
2. Submit an NCL job

   1. ssh –Y yellowstone.ucar.edu
   2. bsub < myjob.lsf
Customize your UNIX editor

• Adds color/highlighting for NCL syntax, functions, etc

• Makes debugging a little easier!

• Many contributed UNIX editor enhancements for NCL

NCL Home Page -> Support -> Editor enhancements

• Emacs, nedit, vim, TextMate, Aquamacs, etc.
---Open WRF output file.

```
dir   = "/-
filename = "wrfout_d01_2008-09-30_00:00:00"
a = addfile(dir + filename + ".nc"), "r")
```

---Read terrain height and lat/lon off file.

```
it   = 0; first time step
hgt  = wrf_user_getvar(a,"HGT",it) ; Terrain elevation
hgt@lat2d = wrf_user_getvar(a,"XLAT",it) ; latitude/longitude
hgt@lon2d = wrf_user_getvar(a,"XLONG",it) ; required for plotting
wks = gsn_open_wks("ps","wrf_gsn")
```

---Set some basic plot options

```
res   = True
res@gsnMaximize = True ; maximize plot in frame
res@gsnDraw = False
res@gsnFrame = False
res@tiMainString = filename
res@cnFillOn = True
res@cnFillPalette = "OceanLakeLandSnow"
res@cnLinesOn = False
res@mpProjection = "CylindricalEquidistant" ; The default
```

---Zoom in on plot

```
res@mpMinLatF = 40
res@mpMaxLatF = 50
res@mpMinLonF = 120
res@mpMaxLonF = 130
```

---Additional resources desired

```
res@mpTickMarkDisplayMode = "Always" ; nicer tickmarks
res@mpDataBaseVersion = "MediumRes" ; better and more map outlines
res@mpDataSetName = "Earth..4"
res@mpOutlineBoundarySets = "AllBoundaries"
res@mpOutlineOn = True
res@lbOrientation = "Vertical"
res@tiMainOffsetYF = -0.03 ; Move the title down
```
Customize NCL environment

• Create “.hluresfile” in home directory

• Change default color map, font, function code, etc.

• Change X11 window or PNG size

• Download sample file from:

NCL Home Page -> Popular Links -> hluresfile
Sample .hluresfile

! Color map
*wkColorMap : cb_rainbow

*Font : helvetica

! Set size of X11 or PNG window
*wkWidth : 1000
*wkHeight : 1000
Where to get more help

Yellowstone quick start guide
“Using NCL in the Yellowstone environment”

Yellowstone questions: cislhelp@ucar.edu

NCL questions: ncl-talk@ucar.edu

Subscribe via:
NCL Home Page -> Support -> Email lists