bash scripting examples

- Scripts are at https://github.com/KevinShook/bash-scripts

Useful command line programs

- GDAL - Geospatial Data Abstraction Library
  - http://www.gdal.org/
- GMT – Generic Mapping Tools
  - http://gmt.soest.hawaii.edu/
- proj.4 – projection/reprojection tool
  - http://proj4.org/
- imagemagick – converts/processes graphics
  - https://www.imagemagick.org/script/index.php
- WINE – allows Windows programs to run under Linux/OSX
  - https://www.winehq.org/
- All are in Linux repositories; have to be installed in Cygwin or OSX

mapWater.sh

- Creates .png images of water stored in ArcGIS .asc files
- Could map elevations by changing the palette

```
!/bin/bash
files=("$@")            # fill array with file names from command-line parameter
for f in "${files[@]}"  # Loop through all specified files
do
  echo $f               # display each file
  filename=${f%.*}      # remove extension
  gdaldem color-relief $f ~/bin/water.pal $filename'.tif' # map file with gdal using palette
  convert -quiet $filename'.tif' $filename'.png'  # convert .tif to .png with imagemagick
  rm $filename'.tif'    # delete .tif
done
```

DRI modelling system

- Created for Drought Modelling Initiative
- Runs CRHM models, and post-processes the output
- Files:
  - `DRIdoall.sh` – calls other scripts/programs
  - `DRIdoruns.sh` – runs CRHM models
  - `FallowStubbleMeanMoistureMaps.sh` - a mapping script

DRIdoall.sh

```
#!/bin/bash
source DRIdoruns.sh # do CRHM runs
cd ./Output  # go to output directory
# call R program
Rscript  ~/Rcode/BatchCRHMSummary.r "CRHM_output_*_CropRotation.txt"
# call scripts to create maps
source do_HRUMeanMoistureMaps.sh CRHM_MeanSoilMoistRatio_SWE3.txt
...
```

DRIdoruns.sh

- Runs CRHM using WINE, renames and moves output file

```
#!/bin/bash
wine CRHM.exe Brandon_CR.prj
mv CRHM_output_1.txt Output/CRHM_output_Brandon_CropRotation.txt
wine CRHM.exe Calgary_CR.prj
mv CRHM_output_1.txt Output/CRHM_output_Calgary_CropRotation.txt
...
```

FallowStubbleMeanMoisture Maps.sh

- Uses GMT programs.

```
# grid data & mask area outside prairies

gmtconvert $f -F0,1,$i -N | surface -GSWE.grd -I0.1 -R-115/-96/49/55 -Ll0.001

grdmath prairie_mask.grd SWE.grd MUL = MaskedSWE.grd

# do contour map

psbasemap -R-115/-96/49/55 -JM20 -K -Ba2f1 -Y5c>
$type"_"$hru"_"$year"_Masked_Contour.ps"

grdcontour MaskedSWE.grd -R-115/-96/49/55 -C0.1 -A0.2 -Gd5c -JM20 -O -K
-Bg30:."$year": >>  $type"_"$hru"_"$year"_Masked_Contour.ps"

psxy prairie.xy -R-115/-96/49/55 -JM20 -O >>
$type"_"$hru"_"$year"_Masked_Contour.ps"
```

Lower Smoky River Data Management System

- Set of bash and gawk scripts built for Alberta Environment
- Runs a CRHM model of the lower Smoky and Little Smoky Rivers in Northern Alberta, and does pre- and post-processing
- Pre-processing scripts extract gridded meteorological variables and produce time series
  - Time series are read in by a Wiski model which combines the forecasts with gauged data to produce CRHM .obs files
- Post-processing scripts massage CRHM output so it can be read in by other Wiski models

Lower Smoky River Data Management System

- https://github.com/KevinShook/LowerSmokyRiverModelScripts
- Both Linux and Cygwin versions of scripts
  - Cygwin scripts are operational, used by Aberta Environment
  - Linux versions are for demonstrations and download and process fewer values to save time
- Cygwin scripts also have Windows .CMD files which can call the bash scripts

scripts

- `get_AT_forecast.sh` – downloads ensemble Air Temperature forecasts for up to 16 days in the future
- Produces time series for specified locations in Wiski model format
- Requires wgrib2 – download from http://opengrads.org/ (Linux/Cygwin), https://trac.macports.org/browser/trunk/dports/science/wgrib2/Portfile (OSX).
- Also requires wget, gawk (standard bash programs)
- Calls `ExtractAT.awk` (a gawk script)
  - Reformats date/time and converts units
- Requires `MetStations.txt` – tab delimited file of station names and locations