Chapter 7 *Sites Conversion*

Objectives:

Often times data which we wish to incorporate into a project is available in digital form but does not come in a format suitable for grass to use. This does not mean that the information cannot be used, but instead that it must be manipulated so that it can be used. In this chapter we will implement various tools and utilities from GRASS, UNIX, and the Visual Editor (VI) to convert digital site information for use as a GRASS sites list. We will also examine the d.sites and Dpoints modules for displaying newly converted sites.

At the end of this chapter you should be able to:

1. Be able to write simple executable scripts which can be used to speed up repeated jobs.

2. Use the following GRASS commands:

    - Mll2u, Mu2ll, Mgc2ll, Mll2gc
    - d.sites, Dpoints

3. Use the following UNIX commands and operators:

    - cut, paste
    - grep
    - more
    - cd, pwd
    - chmod
    - | , < , > , >>

4. Use the following functions in VI.

    - search and replace
    - insert and remove text
    - cursor movement

Before we begin:

Before we start with this project, make sure that your window is set properly and that the monitor is in fixed mode by executing the following commands.

- Gwindow default
- Dcolormode fixed
- Dscreen

Sites conversion:

In the following example, a list of several sites has been provided in a simple ascii text file for use in the Spearfish sample database. However, the file not only contains extra information, such as the words degrees and minutes, but also contains sites which are defined by latitude-longitude. Since GRASS does not use lat/lon coordinates in site files, we will have to convert these locations using the Mll2u[] command, then build a site file in the appropriate directory using the converted information.

First, let's look at an actual GRASS sites file so that we can get an understanding of how it is formatted. The file should be in your home directory which you can easily get to by typing ***cd*** without specifying a path. The sites file is called ***grass_sites***. Use the UNIX command ***more*** to view the file.

cd
more grass_sites

```
name|archsites
desc|Potential historic and archealogical sites

593493|4914730|1 Signature Rock
591950|4923000|2 No Name
589860|4922000|3 Canyon Station
```

Note the order of the coordinates found in the three fields of the file; easting, northing, and label. The easting and northing are all that is required to locate a site. The label is only used to uniquely identify each particular site. Also notice the fields are separated by a "|" (pipe) symbol. This pipe symbol is commonly used as a delimiter in ***ascii*** databases.

Now, look at the file which contains the new site information by again using the ***more*** command. The new sites file name is ***site.-***

data.

more sitedata

The sitedata file should look like the following:

```
latitude 44 degrees 22 minutes 54 seconds north, longitude 103
                         degrees 49 minutes 34 seconds west
latitude 44 degrees 27 minutes 23 seconds north, longitude 103
                         degrees 50 minutes 39 seconds west
latitude 44 degrees 26 minutes 51 seconds north, longitude 103
                         degrees 52 minutes 14 seconds west
latitude 44 degrees 27 minutes 17 seconds north, longitude 103
                         degrees 51 minutes 49 seconds west
```

You can see that there are several things that have to be changed to make ***site.data*** appear similar to ***grass_sites***.

- Lat/lon values must be converted to UTM.
- Extra, unnecessary text must be removed.
- Pipe symbols must be added to delimit the data.

Looking ahead then, we can suggest a method for converting the sites to a GRASS sites file. Those steps would be:

1. Edit the file to make it appear as a series of GRASS commands (shell script), all of which send their output to a single, shared file (***sites.share***).
2. Change the file mode of the newly created shell script so that it is executable and run the script.
3. Extract the eastings and northings from the ***sites.share*** file directing each to their own files; ***eastings*** and ***northings***.
4. Paste the two files, ***eastings, northings***, as well as ***labels***, side by side into one file, ***sites.list.***
5. Edit the ***sites.list*** file to remove extra text and add pipe symbols as delimiters.
6. Copy the file to the appropriate GRASS sites directory so that it may be included in our mapset's sites list.

Generation of Shell Script:

The GRASS conversion program that we will use is Mll2u (lat/lon to UTM). Mll2u converts geographic coordinates to UTM coordinates. Geographic coordinates are, of course, latitude and longitude. The resulting information yields and easting, a northing, and a UTm zone in which the coordinate lies. The syntax for the command is:

Mll2u lat=dd.mm.ss{n|s} lon=dd.mm.ss{e|w} s=spheroid [z=zone]

Since the results normally are directed to standard output (the text screen), we can redirect the output to a file using the redirect (>) unix operator or the redirect/append (>>) unix operator to send the information to a particular file. An example might be:

Mll2u lat=35.25.31n lon=90.45.16w s=clark66 > myhome

Executing this command would create the file *myhome* which would contain an easting, northing, and zone much like the following:

e=703866.86
n=3922323.95
z=15

What we will do is change the site.data file to resemble this command repeated for the number of sites listed in the file. To make the edits necessary, VI (the Visual Editor) will be used. VI is an ascii text editor which has very powerful commands available within it. However, to an unfamiliar user, VI can be a confusing and unfriendly enemy. Follow the directions below carefully and you will have no trouble using the editor.

VI operates in three modes, text insert/edit mode, command mode and command line mode. To move the cursor use j to go down, k to go up, h to move left and l to move right. The text insert edit mode is used for adding text to a file or for editing text which has just been typed. You cannot delete text created at another time while in text mode. Command mode allows you to perform predefined functions on the file like delete characters and lines, insert blank lines and start new text insertions. It also allows you access to the command line mode which is used to read and write files, find text, and replace text among many others. When you are in doubt as to which mode you are in at any given time, hit Esc slowly until you hear a beep from the keyboard. This will always return you to the command mode.

Command line mode can be reached by typing a ":" from the command mode of VI. Upon typing a ":" the cursor will move to the last line of the screen leaving only the colon on that line. When you have reached the command line you may type your VI command and execute it by hitting return.

We will be primarily using the replace text function of the command line mode in this session. It appears rather cryptic at first, but like most functions in VI, it becomes more clear with use.

Open the file ***site.data*** by executing the command ***vi sitedata.***

vi sitedata

The screen appears much like it did when you used the more command, however, you are now in VI. Notice the status line at the bottom of the screen. It tells you the name of the file you are editing as well as the number of lines and characters in the file.

For the purpose of being clear in this document, a • will be used to indicate spaces. Consequently, when using a search and replace command, only type a space where you see a •, otherwise just type all the letters and commands as one long "word."

Working from left to right we will make each line appear like the Mll2u command. The first step is to replace ***latitude•*** with ***Mll2u•lat=***. Go to the command line by typing: . Then follow that with ***g/latitude•/s//Mll2u•lat=/*** . This command can be interpreted as follows: Globally (g) search for (/) the text string latitude• and substitute for it (/s//) the text string Mll2u•lat= replacing the first occurrence on each line (/).

:g/latitude•/s//Mll2u•lat=/

After you execute this command by hitting return, the text will be replace and the resulting screen should resemble the following figure. If it does not, immediately hit the u key to undo your last command. Try the replace command again.

```
Mll2u lat=44 degrees 22 minutes 54 seconds north, longitude 103
                    degrees 49 minutes 34 seconds west
Mll2u lat=44 degrees 27 minutes 23 seconds north, longitude 103
                    degrees 50 minutes 39 seconds west
Mll2u lat=44 degrees 26 minutes 51 seconds north, longitude 103
```

Next, replace the first •*degrees*• with a . by typing *:g/•degrees•/ s//\./* . Note the backslash used before the period, it is used to imply a literal meaning to VI. Normally, a "." means "repeat the last command" to VI, but when preceded with a backslash it gives it a literal meaning.

:g/•degrees•/s//\./

Change the •*minutes*• to a "."

:g/•minutes•/s//\./

Change the •*seconds*• to a "."

:g/•seconds•/s///

The file should now appear as follows:

```
Mll2u lat=44.28.53north, longitude 103 degrees 41 minutes 23 seconds
west
Mll2u lat=44.23.24north, longitude 103 degrees 38 minutes 29 seconds
west
Mll2u lat=44.28.37north, longitude 103 degrees 43 minutes 30 sec-
```

Next, change the ***orth,•longitude•*** (leaving the n) to ***•lon=***.

:g/orth,•longitude•/s//•lon=/

The file adjusts as below:

```
Mll2u lat=44.22.54n lon=103 degrees 49 minutes 34 seconds west
Mll2u lat=44.27.23n lon=103 degrees 50 minutes 39 seconds west
Mll2u lat=44.26.51n lon=103 degrees 52 minutes 14 seconds west
:
:
```

Replace the *•degrees•* in the second half of each line:

:g/•degrees•/s//\./

Replace the *•minutes•*:

:g/•minutes•/s//\./

Your file should now look like this:

```
Mll2u lat=44.22.54n lon=103.49.34 seconds west
Mll2u lat=44.27.23n lon=103.50.39 seconds west
Mll2u lat=44.26.51n lon=103.52.14 seconds west
:
:
```

:g/•seconds•/s///

Remove the ***•seconds•***:

:g/est/s//•s=clark66/

So as to redirect and append the output to a file (***sites.share***) add the necessary redirects to the end of the command:

:g/$/s//•>>•sites.share/

```
        Mll2u lat=44.22.54n lon=103.49.34w s=clark66 >> sites.share
        Mll2u lat=44.27.23n lon=103.50.39w s=clark66 >> sites.share
        Mll2u lat=44.26.51n lon=103.52.14w s=clark66 >> sites.share
:
:
```

The file will not have been created when the first Mll2u command is executed, so we will have to replace the “>>” in the first line with a “>” to create the file. All subsequent Mll2u commands will append their output to *sites.share*.

To do this, move your cursor to the first line by typing *0* followed by *G*. Then type a */* followed by *>>* (and return) to locate your cursor at the first occurrence of a >>. Hit *x* to delete one of the >’s. Your file should now look like the following:

1G
/>>
x

```
        Mll2u lat=44.22.54n lon=103.49.34w s=clark66 > sites.share
        Mll2u lat=44.27.23n lon=103.50.39w s=clark66 >> sites.share
        Mll2u lat=44.26.51n lon=103.52.14w s=clark66 >> sites.share
:
:
```

Save the file by typing ***ZZ***. You have now created the shell script.

ZZ

Changing the File Mode:

Before we can run the shell script as if it were an executable program, we have to change the file mode to add an executable tag to the file. To do this type: ***chmod 700 sitedata***.

chmod 700 sitedata

The shell script is now executable. To run the script simply type ***site.data*** and ***sites.share*** will be generated.

site.data

Extraction of Eastings and Northings:

The next step will be to extract the eastings and northings from the newly created sites.share file. First look at the file by using the ***more*** command.

more sites.share

The file should appear similar to the one below:

```
e=593512.955007
n=4914718.614975
z=13
e=591957.427751
n=4922997.964279
z=13
e=589871.569362
n=4921981.293457
```

To extract the eastings and northings from this file we will use the UNIX commands ***cat*** and ***grep.*** First, extract the eastings to a file by typing: ***cat sites.share | grep e= > eastings***.

cat sites.share | grep e= > eastings

Next, extract the northings by typing ***cat sites.share | grep n= > northings***.

cat sites.share | grep n= > northings

Pasting Files:

We now have two files which can be put side by side in one file to resemble a sites list. To save more work, the file ***labels*** has been provided for you. It is merely a list of site names to accompany the coordinate pairs that we have been working with. Use the command ***paste eastings northings labels > sites.list*** to put the three files side by side in the new file ***sites.list***.

paste eastings northings labels > sites.list

Paste, by default, delimits files with a tab between the original files. Sometimes these tabs can appear as spaces but don't be fooled, they are really tabs. The next step will be to remove the tabs as well as the extra characters which precede each coordinate.

Editing Pasted File:

Again, we will use VI to edit our file. However, this time we will be attempting to make our file look like a GRASS sites list rather than a series of GRASS or UNIX commands. To begin, type ***vi***

sites.list.

vi sites.list

The screen redraws and you see something like the following:

```
e=593512.955007 n=4914718.614975	Signature Rock
e=591957.427751 n=4922997.964279	No Name
e=589871.569362 n=4921981.293457	Canyon Station
:
```

First remove the ***e=*** from the beginning of each line:

:g/e=/s///

Then replace the ***<tab>n=*** with a pipe symbol. The pipe symbol has a specific meaning to VI so it will have to be preceded by a \ to force the literal use of it.

:g/<tab>n=/s//\|/

Finally, replace the second tab with a pipe symbol:

:g/<tab>/s//\|/

Your sites.list file should now look like this, a correctly formatted GRASS site file.

```
593512.955007|4914718.614975|Signature Rock
591957.427751|4922997.964279|No Name
589871.569362|4921981.293457|Canyon Station
:
```


Copy the File:

The only thing left to do is copy the file to the appropriate directory for grass to use it. Our location is spearfish and our mapset is PERMANENT which means that all of our data can be found in /home/grass3.data/spearfish/PERMANENT. The site information, then, falls in the /home/grass3.data/spearfish/PERMANENT/site_lists directory. Copy the file to that directory using the command ***cp sites.list /home/grass3.data/spearfish/PERMANENT/site_lists***.

cp sites.list /home/grass3.data/spearfish/PERMANENT/site_lists

Now use ***list sites*** to make sure that ***sites.list*** is found in your list of site files.

list sites

Display of Sites.list:

To view the sites, first put up a background map such as elevation using the ***Dcell elevation*** command.

Dcell elevation

Now run the GRASS ***d.sites*** program.

d.sites

Specify ***sites.list*** as the name of the sites list to be displayed.

sites.list

Choose a symbol type to use (i.e. +).

2

Choose a color; yellow is good.

3

Choose a size for the icon; three is good.

3

GRASS overlays the sites on top of the cell map. At this point you can rerun the d.sites program and duplicate the site with another icon or color to make them stand out or display another one of the lists that appears in the mapset.

You could also use the command *Dpoints color=yellow size=3 type=+ < /home/grass3.data/spearfish/PERMANENT/site_lists/sites.list*. It is much longer but does the job with no questions asked.

This concludes the sites conversion exercise.