Chapter 3 *Display*

Objectives:

Most of the map preparation within a GIS is done on a graphics screen. This allows for cartographic and analytic experimentation. It also is much cheaper than printing various paper maps and more effective than some textual representations of data. This chapter will introduce you to the display commands within GRASS.

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

1. Start and select a graphics monitor in GRASS for your machine.

2. Select, unlock and force the release of a graphics monitor.

3. Use the following GRASS commands:

    - d.mon [start=, select=, unlock=, stop=]
    - d.frame [-e], d.erase [color]
    - d.rast [-o]
    - d.what.rast
    - d.what.vect
    - d.where

4. Start and stop GRASS.

Starting GRASS:

Normally, you would probably start GRASS from the graphics terminal so as to initiate the graphics driver. We will use this method to start GRASS, however, there are several ways to start GRASS from other than the graphics terminal. The steps used to start GRASS on the graphics terminal are as follows.

1. Login to the graphics terminal.
2. Start X-windows (OpenWindows or Motif window managers).
3. Start GRASS by typing *grass4.0*.
4. Choose a Location and Mapset.
5. Run the *d.mon* program in GRASS.
    b. Start a graphics monitor (*1*).
        i. list the available monitors.
        ii. start one of the X-windows drivers (i.e. *x0*)
    b. Select a graphics monitor (*3*)
    c. Quit *d.mon* (*[return]*).

GRASS d.mon program menu.

```
                    MONITOR MENU


Making sure that the graphics monitor is running

     1 - start a graphics monitor
     2 - stop a graphics monitor

Choosing a graphics monitor for your graphics

     3 - select a graphics device for output
         (currently selected monitor: x0)

     4 - relinquish control of the graphics device
         (let someone else use it)

RETURN - quit

>
```

You are now be ready to display to the X-graphics window.

Note: *A unix shell script can be written to start the graphics window without having GRASS running. A description of how to do this wil be included in a future Appendix. Also, a common way to use GRASS is to devote the graphics terminal solely to graphics display and to use a "dummy" terminal to enter commands. If you wish to use this method, 1) exit GRASS, 2) log on to the "dummy" terminal, 3) start GRASS on the "dummy" terminal and, 4) use* ***d.mon*** *to reselect the monitor.*

For starting GRASS on your current system, use the following steps:

Console (Graphics Monitor)

mach login:
class

Password:
learngrass

Logs you onto the system.

class on mach_name:
openwin

Open Windows starts and windows appear... move mouse to cmdtool window, click left and then type:

mach_name
d.start.x0

Note: This is a special script which may not exist on your system. Consult the GRASS 4.0 manual for information on developing such a script.

The X-windows graphics driver starts. Choose full-size from the window header menu to enlarge the window. Next, move to the “dummy” terminal to start GRASS.

Dummy Terminal

mach login:
class

Password:
learngrass

grass on mach_name:
grass4.0

Select your location and mapset then hit *[Esc]* to continue.

Mapset <name> in Location <name>.
GRASS 4.0 >
d.mon select=x0

Mapset <name> in Location <name>.
GRASS-GRID>

You may now enter any valid GRASS command.

You should now have GRASS started and ready to use.

Displaying Data Layers:

d.rast and *d.vect*:

GRASS has several tools for displaying data layers (raster and vector data). The two most commonly used are *d.rast* (display raster map) and *d.vect* (display vector map). *d.rast* will display grid cell maps in the current graphics region and *d.vect* will display vector (*v.digit*) maps in the current graphics region. First try using the *d.rast* command:

```
d.rast elevation.dem
```

The elevation data layer should appear on the screen. Now see what happens when you *d.rast* another map. *d.rast geology*:

```
d.rast geology
```

The second map overwrites the first. *d.rast* will always overwrite what is currently on the graphics screens if no options (flags) are specifed. Next, clear the screen using *d.erase*.

```
d.erase
```

Now look at a vector map. Use *d.vect* to display the roads data layer.

```
d.vect roads
```

d.vect has 9 options for color. Try the same command again but this time attach *color=red* to the end.

```
d.vect roads color=red
```

The roads appear in red. Use *g.list vect* and *g.list rast* to see what vector and raster files are available to you in your current location.

```
g.list vect
g.list rast
```

Now experiment with the commands that you just learned, *g.list*, *d.rast*, *d.vect* and *d.erase* to view several of the data layers.

d.what.rast, *d.what.vect* and *d.where*:

GRASS allows you to query raster and vector maps on the screen for attribute information and also for location. It does this with three commands: *d.what.rast* , *d.what.vect* and *d.where*. Execute the following commands to use *d.what.rast*.

```
d.erase
d.rast elevation.dem
d.what.rast
```

Now move you mouse around the screen and click on a area. GRASS reports to you the category value at that location. *d.what.rast*, when executed with no parameters (flags), reads from the data layer which is currently displayed. However, you may specify up to 14 layers for *d.what.rast* to query at once. To try this execute the following:

```
d.what.rast map=elevation.dem,geology,soils,landuse,owner
```

GRASS reports to you the category values for each of the 5 layers. Next, use *d.where* to read only locations from the screen.

```
d.where
```

Move to any location on the screen and click. GRASS reports to you the coordinates that you have pointed to.

d.rast -o (Raster Overlay):

Some maps are not complete coverages, but rather resemble patchwork quilts of data and no-data areas. First *d.rast* the landuse data layer and then use *d.what.rast* to spot check several of the areas.

```
d.erase
d.rast landuse
d.what.rast
```

It is often valuable to view two maps together, one a patchwork and the other a complete coverage. GRASS does this with the *-o* flag and the *d.rast* command. First, display the complete coverage using *d.rast*. Next, overlay the patchwork layer on (top of) the complete coverage. Think of the no-data areas as holes, GRASS allows the complete coverage to show through the holes.

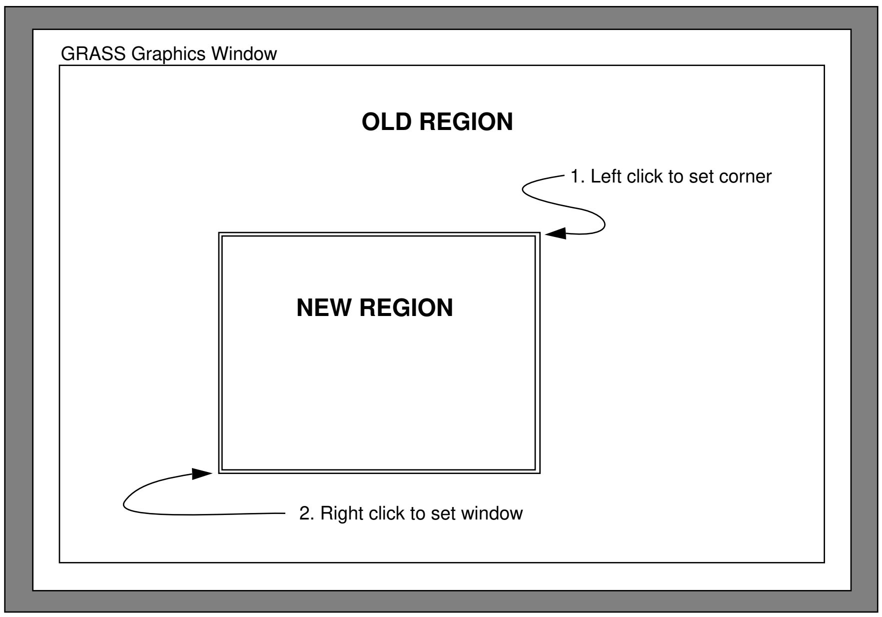
```
d.rast elevation.dem
d.rast -o landuse
```

Experiment with several layers using the *d.rast -o* command.

Changing Regions:

So far we have looked at various layers from one region. GRASS has the ability to zoom in and out on data by means of a definable rectangular region, a "window on the world". To set a new region use the *d.zoom* command. See the diagram below for setting a region.

```
d.rast elevation
d.zoom
```



Before displaying another map, use *d.frame -e* to clear the screen and set a new frame. This not only gives you a clear screen to work with, but also resets the working region. If you did not clear the screen after setting the region, your working region would remain the same.

```
d.frame -e
d.rast elevation.dem
```

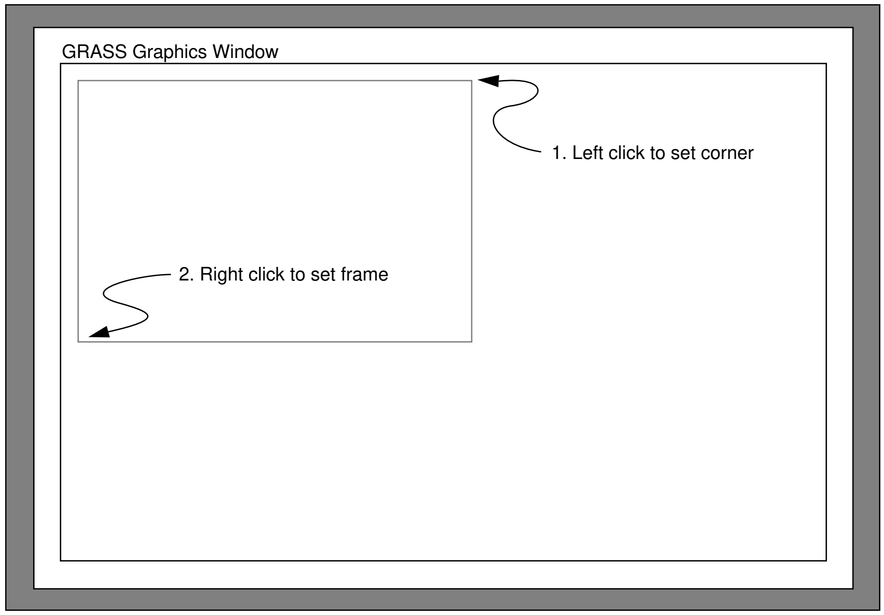
Multiple Windows on a Screen:

Another useful feature is the ability to create more than one frame on the graphics screen to display graphics to. You use the *d.frame -c* (create) and *d.frame -s* (select) commands to do this. First, reset the window to its default size with the *g.region* command.

```
g.region default
d.frame -e
d.rast elevation.dem
```

Now make a new frame using *d.frame* -c

.



Set the new frame. At this point you have created a new frame on the screen but don't have control of it. If you were to *d.rast* a map, the full screen would be used, in fact there is a frame called full_screen which covers the entire screen. This is the frame which is used for most graphics. It is created (and selected) by *d.frame -e*. To gain control of your new frame use *d.frame -s* (select).

```
d.frame -s
```

Point to the frame, left click to select it, and then right click to accept it if you have highlighted the one you want. You now have control of the new frame. Erase the contents of the frame using *d.erase*. Using *d.frame -e* now would erase your entire screen and reset the full_screen frame.

```
d.erase
```

d.rast a map.

```
d.rast elevation.dem
```

The map appears within the frame. Notice that the region remains the same from frame to frame, only the size at which the map is displayed is affected.

Try several new frames and display various maps within them. Be careful not to get two frames exactly on top of one another as GRASS could get confused and cause you difficulties.

Summary:

The tools demonstrated in this chapter are some of the most common and useful display commands within GRASS. Learn how these work and get comfortable using them as they are key to almost all operations in GRASS. Other display commands which might be of interest are: *d.3d*, *d.sites* and *d.label*. Use the *g.help* and *g.manual* commands in GRASS to get information on how to execute these commands.