The GBO Computing Environment

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The GBO Ecosystem

- **GBT Operator – not a scientist**
    - Physically present at telescope
    - Their priority is the telescope

- **Project 'Friend' – scientist or data analyst**
    - Usually similar scientific interests to your project
    - Will help with your script-writing and can advise on calibration, observing method, etc.
    - Can advise on data reduction
    - Not responsible for scientific decisions

- **On-call Support Scientist– scientist or data analyst**
    - Could be any scientific staff member
    - Likely to be present for your first observing sessions
    - Likely to be the one you speak to if something goes wrong

Getting Help

- ## Project 'Friend'

  - Can usually give you observing support, or at least point you to right person

  - Contact 'friend' for any issues related to your observations

- ## On-call Support Scientist

  - The operator will call the on-call support scientist if necessary

- ## Helpdesks

  - **helpdesk-gb@nrao.edu** – For systems or account problems
  - https://help.nrao.edu/ - Observers helpdesk for general questions

Logging In

Getting an account

- You should have an account (or at least be aware of why you don't) today, if you don't already

See: www.gb.nrao.edu/pubcomputing/visitors.shtml

- Account will be active for two years after you stop using it

Logging In

The easy way

FastX – Covered in more detail earlier (Remote Observing – A. Seymour)

- https://ssh.gb.nrao.edu:3443/auth/ssh

- What machine should I use?
  https://www.gb.nrao.edu/pubcomputing/public.shtml

  - Data Reduction or Observing machines are labelled, logging in to check for something or similar – use XFCE

  - If you are going to start Astrid, Cleo, GBTIDL or pretty much any software, don't use XFCE

Logging In

The hard way

VNC

- https://science.nrao.edu/facilities/gbt/observing/remote-observing-with-the-gbt

- Some benefits but also more pitfalls, up to user to get software working on their home machine. The helpdesk can help if there are connectivity issues or similar but can't support installation/operation of non-GBO software on non-GBO machines.

- If you don't know why you might want to use the VNC method, you probably don't

Logging In

You will not have control of the telescope until the operator puts you in the gateway!

Look for prompts if things freeze up

Linux

There is a LOT to Linux but it's easy to get started

Most things are achieved in Linux by typing commands directly into a terminal window
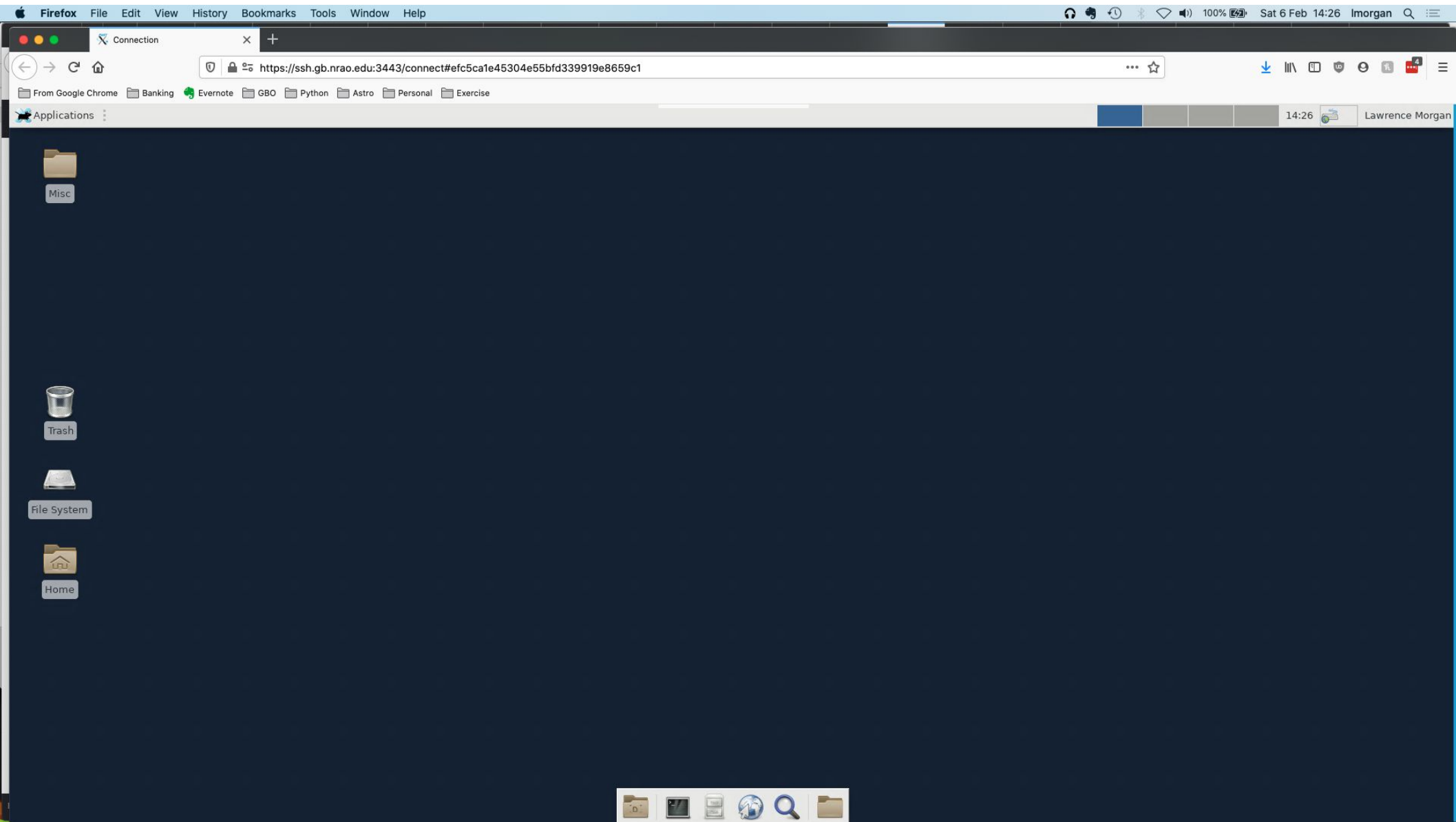
Linux

Starting a terminal is usually done via GUI, can be done via keyboard shortcuts, depending on flavour of Linux (e.g. Ubuntu, Redhat – also different environments like KDE or Gnome)

Once logged in, your screen will look like

Linux

Linux

Open a terminal by clicking on the bottom panel icon

> ls will show you the files in your home directory

You have two main areas you can work in

~username = /home/users/username/ - 20 GB limit general working area for script preparation, etc. This area is backed up regularly.

/home/scratch/username/ - This is where you should perform your data reduction and analysis. This is a working area for data currently being worked on and should not be used for long-term data storage. This area is not backed up.

Linux Commands

There are many, many commands. Some are specific to distributions and/or installable packages but some general ones are

- **ls** – this lists the files and directories on the named path. There are many options to customise this command

- **Pwd** – list the path to the current directory

- **cd** – change directory to a named path, without a path it will take you to your home directory

- **mkdir** – create a directory (equivalent to a Windows folder)

- **rm/rmdir** – remove a file/directory, note that only empty directories will be removed without using additional flags

- **cp/mv** – copy/move a file or directory

- use the --help flag or > **man** to find more information on a command

- **apropos** is a very useful command for when you forget another command, e.g. '> apropos pdf' will return a list of all commands relevant to reading/writing pdfs or anything else with a pdf-related keyword attached to it

- Many more – **echo**, **cat**, **sudo**, **df**, **du**, **ps**, **tar**, **zip**, are other commands worth looking up

Linux Tips

- Try to avoid spaces – creating 'my directory' will be confusing and problematic, you'll either end up with two directories called 'my' and 'directory' or will have to use the name 'my\ directory' to account for the space (and this won't always work)

- Up arrow – hitting the up arrow will cycle back through all of the commands you've used in your current session

- Ctrl-r – this allows you to search back through previous commands

- Ctrl-c – will cancel the currently running command (in most circumstances) – useful if you accidentally start a routine

- Middle click – highlighting some text and clicking the middle button of your mouse (or left and right buttons at the same time) will paste that text into the window clicked on

- Tab – hitting tab twice works as an autocomplete with suggestions (depending on your setup)

- Ctrl-z – this will 'suspend' your currently running shell/software, bg and/or & will place things in the background, allowing you to continue using your terminal shell

- Exit – will close your terminal (in most cases)

Applications

CLEO, Astrid and GBTIDL are the three main applications you're likely to use on GBO systems

Any of these can be started by simply typing the name on the command line, e.g.

> cleo (already covered by B.Gregory and A.Bonsall)

> astrid (already covered by B.Gregory and A.Bonsall)

> gbtidl (will be covered by P.Salas)

Some Application Tips

CLEO

> cleo -help and cleo -examples will give you some useful short documentation on starting with CLEO

> cleo application (try cleo status) will directly start up the application without having to go through the gui

> cleocontainer can be very useful

> Hovering over a cleo box will often give a short description of the parameter

> Double right-clicking on a cleo box will start a real-time plot of that variable

Some Application Tips

Astrid

> astrid & - to keep access to your terminal

◻A personal recommendation (contrary to what we put in the Observers Guide) is to put your configuration in your scripts, not 'execfile' them. This is because Astrid logs can be retrieved and will record what is in the script but not anything referenced by execfile.

◻Astrid is essentially a Python notebook, you can use pythonic commands to retrieve system settings, print statements, perform loops and more.

Some Application Tips

GBTIDL - http://gbtidl.nrao.edu/

Guides and references are very useful

• Filler – your data are 'filled' in real-time. This allows quick-look checks using GBTIDL. However, there can be errors in this filling – see later

• > gbtidl to start – > summary to show online data

• Data containers - !g.s[0] gives you many parameters

• > listcols will show you readily available information parameters

• > select allows you to investigate individual polarisations, beams, integrations, etc

• GBTIDL and IDL are not always the same thing

Some Application Tips

sdfits

 sdfits -help shows options

 your data are 'filled' in real-time for quick checking (and would be adequate for analysis most of the time. However, sdfits is doing things to your data you should be aware of, e.g.

- Flagging – largely relevant for old spectrometer but scans may still be flagged

- If data rates are high, scans may be skipped.

- Centre or spur channel of VEGAS is interpolated – Not going to cause any problems but mistakes get made when observers don't know what's actually happening to their data.

 It is up to you if you would like to re-fill your data using sdfits. If you're sure that there have been no scans skipped and have no other reason to flag your data, the automatic online filled data are probably fine.

Some Application Tips

sdfits

•To re-fill data

•>sdfits /home/gbtdata/ProjID_Session
 /home/scratch/uname/dname --options

•This will likely result in the warning

   The path you are attempting to write to:

   /home/scratch/uname/dname/,

   will be using the Network File System, and is not a local disk.

   This may result in non-optimal performance.

   It is recommended that you write to a local disk.

   Continue? [Y/N]

Starting up Applications

Gbtgridder

• > gbtgridder -h shows help, very limited documentation but this is a very useful tool.

• gbtgridder takes an sdfits file (or multiple files) as input so you need to be clear what it is that is in those files. This may take some practice with data input/output with gbtidl

• gbtgridder has some poor values used as defaults, this is currently being addressed but you should talk to your project friend if you have any questions about what is actually being done by this application

• gbtgridder needs pre-calibrated data as input so, again, talk to project friend