



Installing and Maintaining a Local Galaxy Server - Training Day 0

George Magklaras, Katerina Michalickova, Nikolay Vazov

USIT - Universitetets Senter for InformasjonsTeknologi

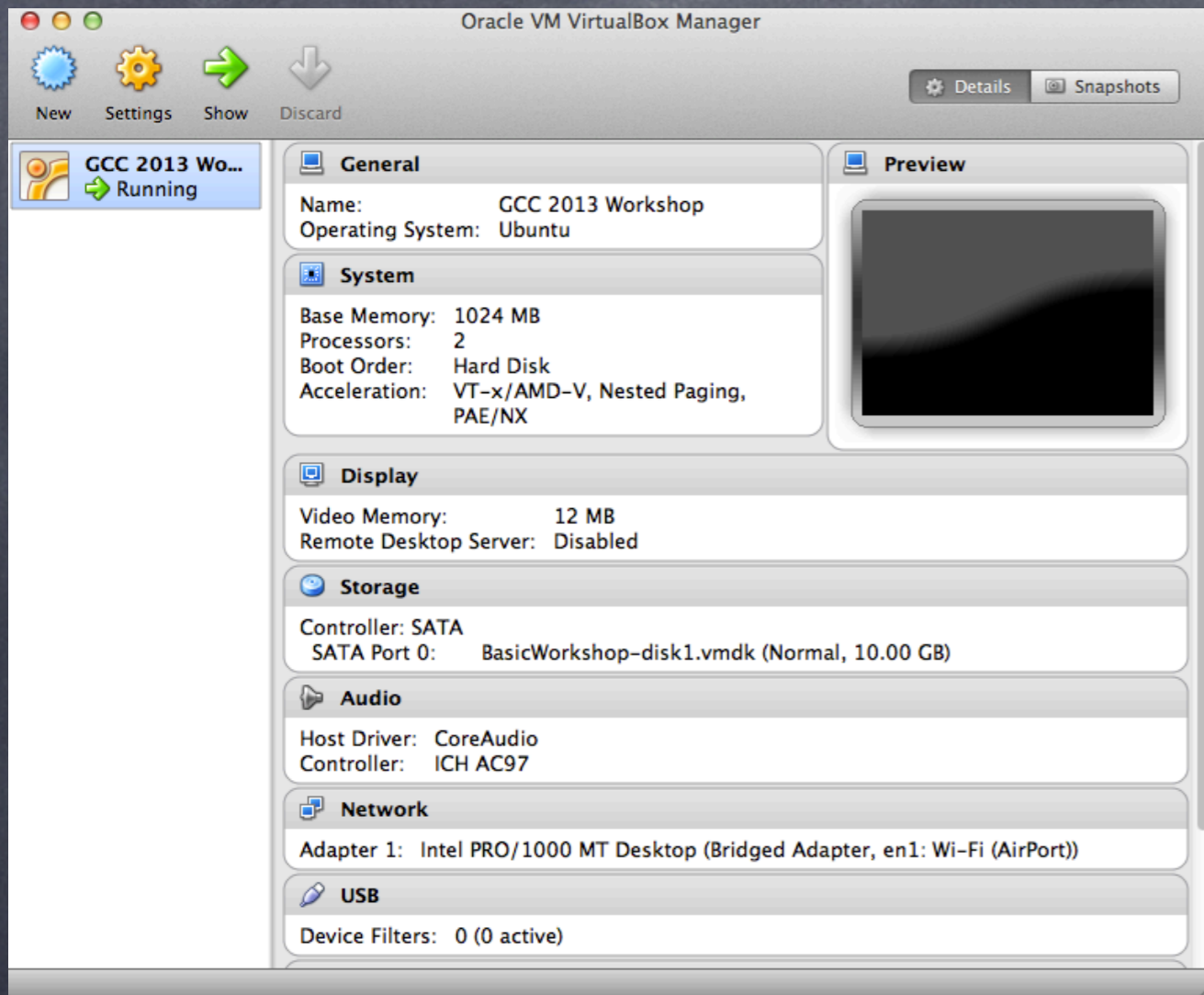
Research Computing Services

<http://www.uio.no/english/services/it/research/hpc/abel/>

Introduction and Agenda

- **GM:** Introduction (VM status, the galaxy environment)
- **NV:** configure Postgres, install Apache as proxy, configure and start Galaxy
- **GM:** Aspects of Galaxy administration: roles, groups, libraries and quotas
- **KM:** How do you install tools in Galaxy
- **NV:** Updating the Galaxy installation
- **GM:** A few closing words on securing your Galaxy installation

VM installation check



VM image download:
<ftp://ftp.no.embnet.org/galaxy/images/BasicWorkshop.ova>

Username: gcc2013

Password: 12345

Hands up if you have not:

- Downloaded the BasicWorkshop.ova image
- Installed VirtualBox and run the VM properly

The FTP workshop repository and Wi-Fi credentials

<ftp://ftp.no.embnet.org/galaxy/>

Wi-Fi at UiO:

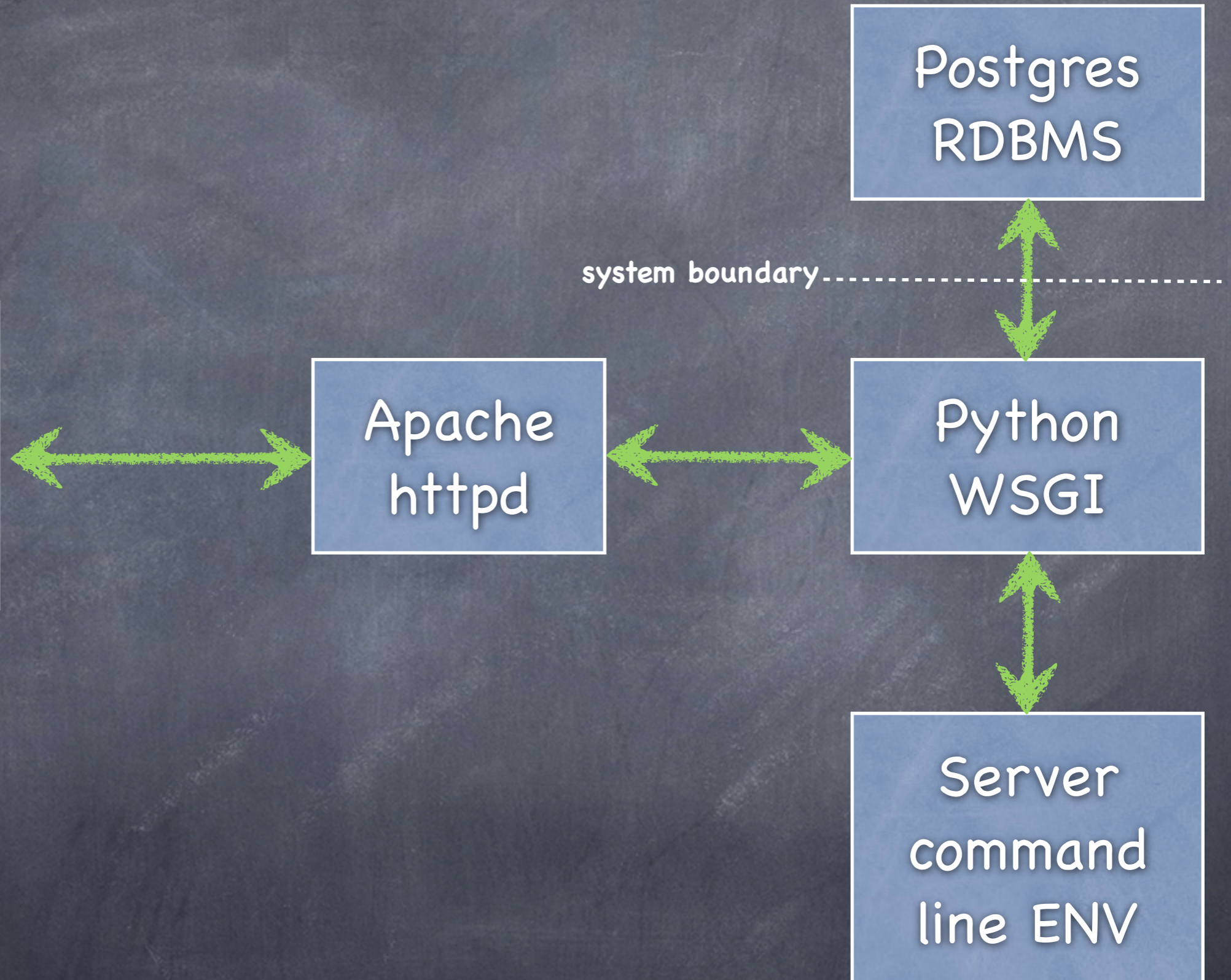
SSID: conferences

Password: uio202aar

The Galaxy system environment (standalone)



end user



The Galaxy system environment (HPC)

SSO gateway

Postgres RDBMS

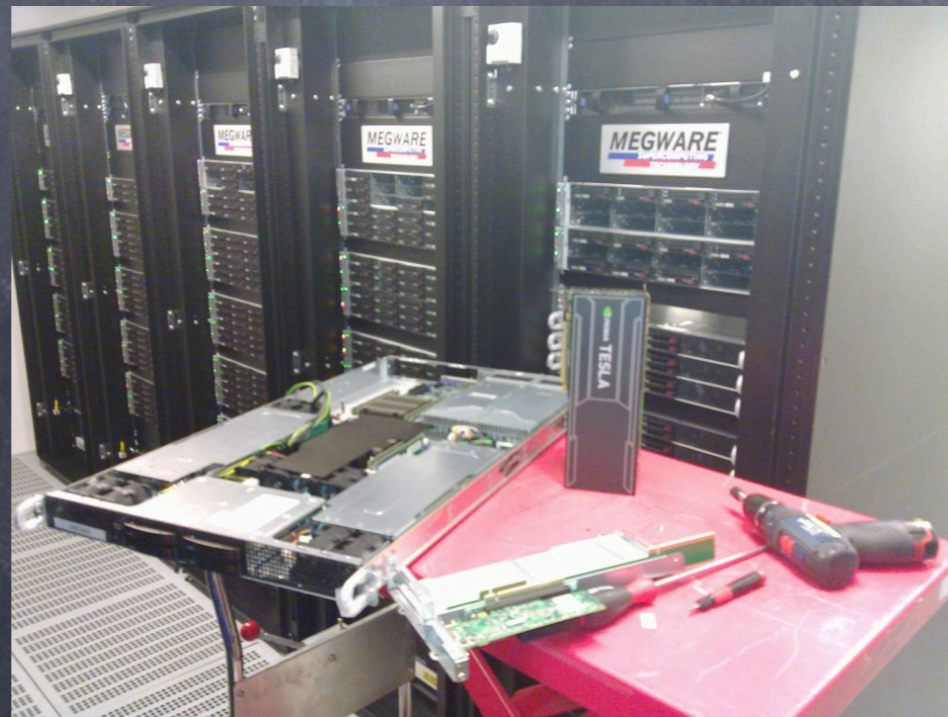
system boundary

Apache httpd

Python WSGI



end user



supercomputer

Queue/job submission software

The Galaxy system environment (deployment)

-VM, cloud or in-house physical server?

-For 1-10 simultaneous users that do not need to share data or have small datasets (< 2 Tbytes), a VM option or a cloud provider (Amazon, Rackspace). RAM should be no less than 16-32 Gigs and space can easily take a few Tbytes, depending on your projects.

-If you have > 10 simultaneous users that need to share (upload, download) tenths of Tbytes of data, do invest on an in-house physical server (see next slide).

-What kind of data will you be processing?

-Security sensitive data?

-Data streams from restricted instrument labs?

-Expertise, manhours needed for maintenance?

-Large production installations need at least 12-18 man hours weekly.

-Unix/Linux/RDBMS skills (life science aware sysadmin or linux friendly PhD/Postdoc)

The Galaxy system environment (hardware)



32-64 processing cores, 256-512 Gigs of RAM rack mount server with a capable RAID (6, 6+0) hardware controller (SAS/SATA)



Directly Attached Storage (DAS) SATA/SAS cabinets.

The minimum config for a good in-house server solution. Can scale to 100 Tbytes of storage. Your specs depend on your project requirements.

Beginning of the practical/fun
fire up your VMs!

Postgres Configuration (2)

```
Terminal - gcc2013@gcc-workshop: ~
File Edit View Terminal Tabs Help
gcc2013@gcc-workshop:~$
gcc2013@gcc-workshop:~$
gcc2013@gcc-workshop:~$
gcc2013@gcc-workshop:~$
gcc2013@gcc-workshop:~$
gcc2013@gcc-workshop:~$
gcc2013@gcc-workshop:~$
gcc2013@gcc-workshop:~$
gcc2013@gcc-workshop:~$
gcc2013@gcc-workshop:~$
gcc2013@gcc-workshop:~$ sudo apt-cache search postgresql | grep client
libpq5 - PostgreSQL C client library
postgresql-client - front-end programs for PostgreSQL (supported version)
postgresql-client-9.1 - front-end programs for PostgreSQL 9.1
postgresql-client-common - manager for multiple PostgreSQL client versions
guile-pg - Guile bindings for the PostgreSQL client library
libghc-postgresql-simple-dev - mid-level PostgreSQL client library
libghc-postgresql-simple-doc - mid-level PostgreSQL client library; documentation
libghc-postgresql-simple-prof - mid-level PostgreSQL client library; profiling libraries
libpgtcl-dev - Tcl client library binding for PostgreSQL - development files
libpgtcl1.5 - Tcl client library binding for PostgreSQL
libsphinxclient-0.0.1 - Fast standalone full-text SQL search engine - Client library
libsphinxclient-dev - Fast standalone full-text SQL search engine - Client library
ltsp-cluster-control - Web based thin-client configuration management
node-pg - PostgreSQL client library for Node
pfm - PostgreSQL graphical client using Tcl/Tk
pgstaging-client - client script for pgstaging
pgxnclient - command line client for the PostgreSQL Extension Network
postgres-xc-client - front-end programs for Postgres-XC
python3-postgresql - pgsq driver, cluster management tools, and client tools
root-plugin-sql-pgsq - PostgreSQL client plugin for ROOT
tryton-client - Tryton Application Platform (Client)
gcc2013@gcc-workshop:~$ sudo apt-get install postgresql-client-9.1 postgresql-client-common
```

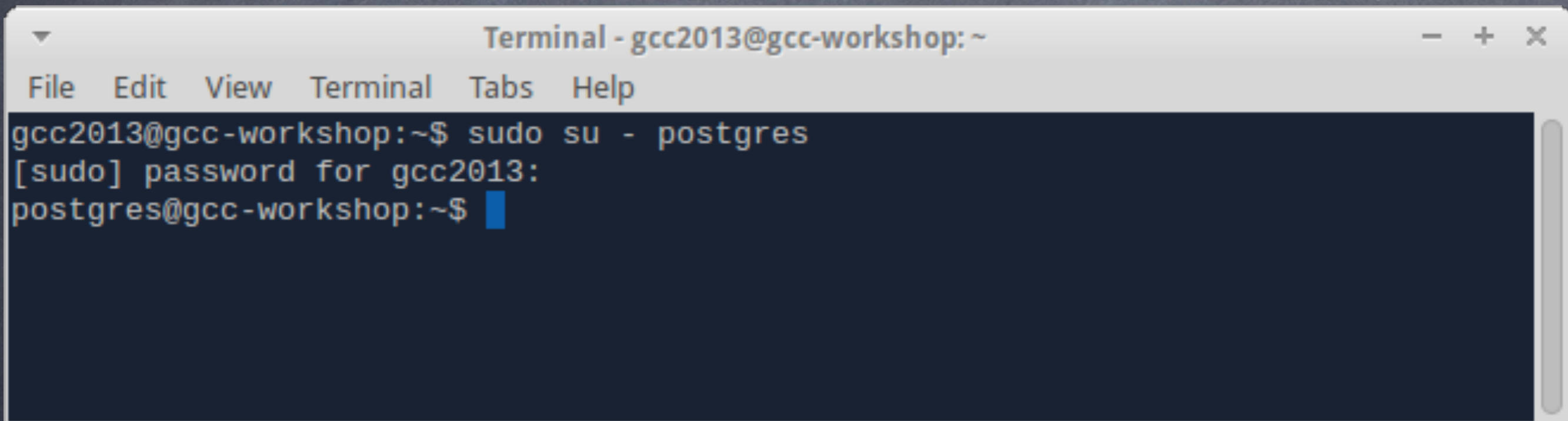
Install the postgresSQL client from the package manager

Postgres Configuration (4)

```
Terminal - gcc2013@gcc-workshop: ~
File Edit View Terminal Tabs Help
gcc2013@gcc-workshop:~$
gcc2013@gcc-workshop:~$
gcc2013@gcc-workshop:~$
gcc2013@gcc-workshop:~$
gcc2013@gcc-workshop:~$
gcc2013@gcc-workshop:~$
gcc2013@gcc-workshop:~$
gcc2013@gcc-workshop:~$
gcc2013@gcc-workshop:~$
gcc2013@gcc-workshop:~$ ps aux | grep postgres
postgres 1014 0.1 0.7 52228 7940 ? S 09:47 0:01 /usr/lib/postgresql/9.1/bin/postgres -D /var/lib
/postgresql/9.1/main -c config_file=/etc/postgresql/9.1/main/postgresql.conf
postgres 1574 0.0 0.1 52228 1572 ? Ss 09:47 0:00 postgres: writer process
postgres 1575 0.0 0.1 52228 1332 ? Ss 09:47 0:00 postgres: wal writer process
postgres 1576 0.0 0.2 52660 2436 ? Ss 09:47 0:00 postgres: autovacuum launcher process
postgres 1577 0.0 0.1 22428 1400 ? Ss 09:47 0:00 postgres: stats collector process
gcc2013 1982 0.0 0.0 5908 864 pts/0 S+ 10:00 0:00 grep --color=auto postgres
gcc2013@gcc-workshop:~$
gcc2013@gcc-workshop:~$
gcc2013@gcc-workshop:~$
gcc2013@gcc-workshop:~$
gcc2013@gcc-workshop:~$ sudo /etc/init.d/postgresql stop
* Stopping PostgreSQL 9.1 database server [ OK ]
gcc2013@gcc-workshop:~$ sudo /etc/init.d/postgresql start
* Starting PostgreSQL 9.1 database server [ OK ]
gcc2013@gcc-workshop:~$ sudo /etc/init.d/postgresql status
9.1/main (port 5432): online
gcc2013@gcc-workshop:~$
```

How do I stop and start the postgresSQL server?

Postgres Configuration (5)



```
Terminal - gcc2013@gcc-workshop: ~  
File Edit View Terminal Tabs Help  
gcc2013@gcc-workshop:~$ sudo su - postgres  
[sudo] password for gcc2013:  
postgres@gcc-workshop:~$
```

When you need to handle Postgres, sudo to username 'postgres' prior calling the Postgres client (psql)

Postgres Configuration (6)

```
Terminal - gcc2013@gcc-workshop: ~
File Edit View Terminal Tabs Help
gcc2013@gcc-workshop:~$ sudo su - postgres
[sudo] password for gcc2013:
postgres@gcc-workshop:~$ psql template1
psql (9.1.9)
Type "help" for help.

template1=# CREATE USER gcc2013 WITH PASSWORD '12345';
ERROR:  role "gcc2013" already exists
template1=# CREATE DATABASE galaxy;
ERROR:  database "galaxy" already exists
template1=# GRANT ALL PRIVILEGES ON DATABASE galaxy TO gcc2013;
GRANT
template1=# \q
postgres@gcc-workshop:~$ sudo su - gcc2013
[sudo] password for postgres:
Sorry, try again.
[sudo] password for postgres:
Sorry, try again.
[sudo] password for postgres:
Sorry, try again.
sudo: 3 incorrect password attempts
postgres is not in the sudoers file.  This incident will be reported.
postgres@gcc-workshop:~$ exit
logout
gcc2013@gcc-workshop:~$ sudo su - gcc2013
gcc2013@gcc-workshop:~$ psql -d galaxy -U gcc2013
psql (9.1.9)
Type "help" for help.

galaxy=> █
```

Galaxy user creation and galaxy DB creation

Apache Proxy config (1)

```
Terminal - gcc2013@gcc-workshop: ~
File Edit View Terminal Tabs Help
gcc2013@gcc-workshop:~$ sudo apt-cache search apache | grep apache2
apache2 - Apache HTTP Server metapackage
apache2-doc - Apache HTTP Server documentation
apache2-mpm-event - Apache HTTP Server - event driven model
apache2-mpm-prefork - Apache HTTP Server - traditional non-threaded model
apache2-mpm-worker - Apache HTTP Server - high speed threaded model
apache2-prefork-dev - Apache development headers - non-threaded MPM
apache2-threaded-dev - Apache development headers - threaded MPM
apache2-utils - utility programs for web servers
apache2.2-bin - Apache HTTP Server common binary files
apache2.2-common - Apache HTTP Server common files
libapache2-mod-apparmor - changehat AppArmor library as an Apache module
libapache2-mod-auth-mysql - Apache 2 module for MySQL authentication
libapache2-mod-auth-pgsql - Module for Apache2 which provides pgsql authentication
libapache2-mod-auth-plain - Module for Apache2 which provides plaintext authentication
libapache2-mod-macro - Create macros inside Apache config files
libapache2-mod-perl2 - Integration of perl with the Apache2 web server
libapache2-mod-perl2-dev - Integration of perl with the Apache2 web server - development files
libapache2-mod-perl2-doc - Integration of perl with the Apache2 web server - documentation
libapache2-mod-php5 - server-side, HTML-embedded scripting language (Apache 2 module)
libapache2-mod-python - Python-embedding module for Apache 2
libapache2-mod-python-doc - Python-embedding module for Apache 2 - documentation
libapache2-mod-wsgi - Python WSGI adapter module for Apache
libapache2-reload-perl - module for reloading Perl modules when changed on disk
libapache2-mod-fastcgi - Apache 2 FastCGI module for long-running CGI scripts
apache2-mpm-itk - multiuser MPM for Apache 2.2
apache2-suexec - Standard suexec program for Apache 2 mod_suexec
apache2-suexec-custom - Configurable suexec program for Apache 2 mod_suexec
libapache-mod-jk-doc - Documentation of libapache2-mod-jk package
libapache2-authcassimple-perl - Apache2 module to authenticate through a CAS server
libapache2-authcookie-perl - Perl Authentication and Authorization via cookies
```

What apache* packages are available?

Apache Proxy config (2)

```
Terminal - gcc2013@gcc-workshop: ~
File Edit View Terminal Tabs Help
libapache2-webkdc - Apache 2 modules for a WebAuth authentication KDC
mahara-apache2 - Electronic portfolio, weblog, and resume builder - apache2 configuration
rt4-apache2 - Apache 2 specific files for request-tracker4
torrus-apache2 - Universal front-end for Round-Robin Databases (for apache 2.x) (deprecated)
gcc2013@gcc-workshop:~$
gcc2013@gcc-workshop:~$ sudo apt-get install apache2
```

Install the Apache web server

Apache Proxy config (3)

```
Terminal - root@gcc-workshop:~  
File Edit View Terminal Tabs Help  
root@gcc-workshop:~# service nginx status  
* nginx is running  
root@gcc-workshop:~# service nginx stop  
* Stopping nginx nginx [ OK ]  
root@gcc-workshop:~# apt-get  
autoclean          check          dselect-upgrade  source  
autoremove        clean          install           update  
build-dep          dist-upgrade   purge            upgrade  
changelog          download       remove  
root@gcc-workshop:~# apt-get remove nginx  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
The following packages were automatically installed and are no longer required:  
  nginx-common nginx-full  
Use 'apt-get autoremove' to remove them.  
The following packages will be REMOVED:  
  nginx  
0 upgraded, 0 newly installed, 1 to remove and 1 not upgraded.  
After this operation, 91,1 kB disk space will be freed.  
Do you want to continue [Y/n]? Y  
(Reading database ... 201572 files and directories currently installed.)  
Removing nginx ...  
root@gcc-workshop:~#
```

Our VM image comes with nginx. Make sure that you stop and remove it. nginx is a web server equivalent to Apache.

Apache Proxy config (4)

```
Terminal - gcc2013@gcc-workshop: ~
File Edit View Terminal Tabs Help
gcc2013@gcc-workshop:~$ sudo /etc/init.d/apache2 start
* Starting web server apache2
[Wed Jun 26 15:45:11 2013] [warn] module alias_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module auth_basic_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module authn_file_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module authz_default_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module authz_groupfile_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module authz_host_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module authz_user_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module autoindex_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module cgid_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module deflate_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module dir_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module env_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module mime_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module negotiation_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module reqtimeout_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module setenvif_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module status_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] The Alias directive in /etc/apache2/mods-available/alias.conf at line 15 will probably never match because it overlaps an earlier Alias.
apache2: Could not reliably determine the server's fully qualified domain name, using 127.0.1.1 for ServerName
httpd (pid 1849) already running
[ OK ]
gcc2013@gcc-workshop:~$
```

Start the apache2 service and ignore the warnings.

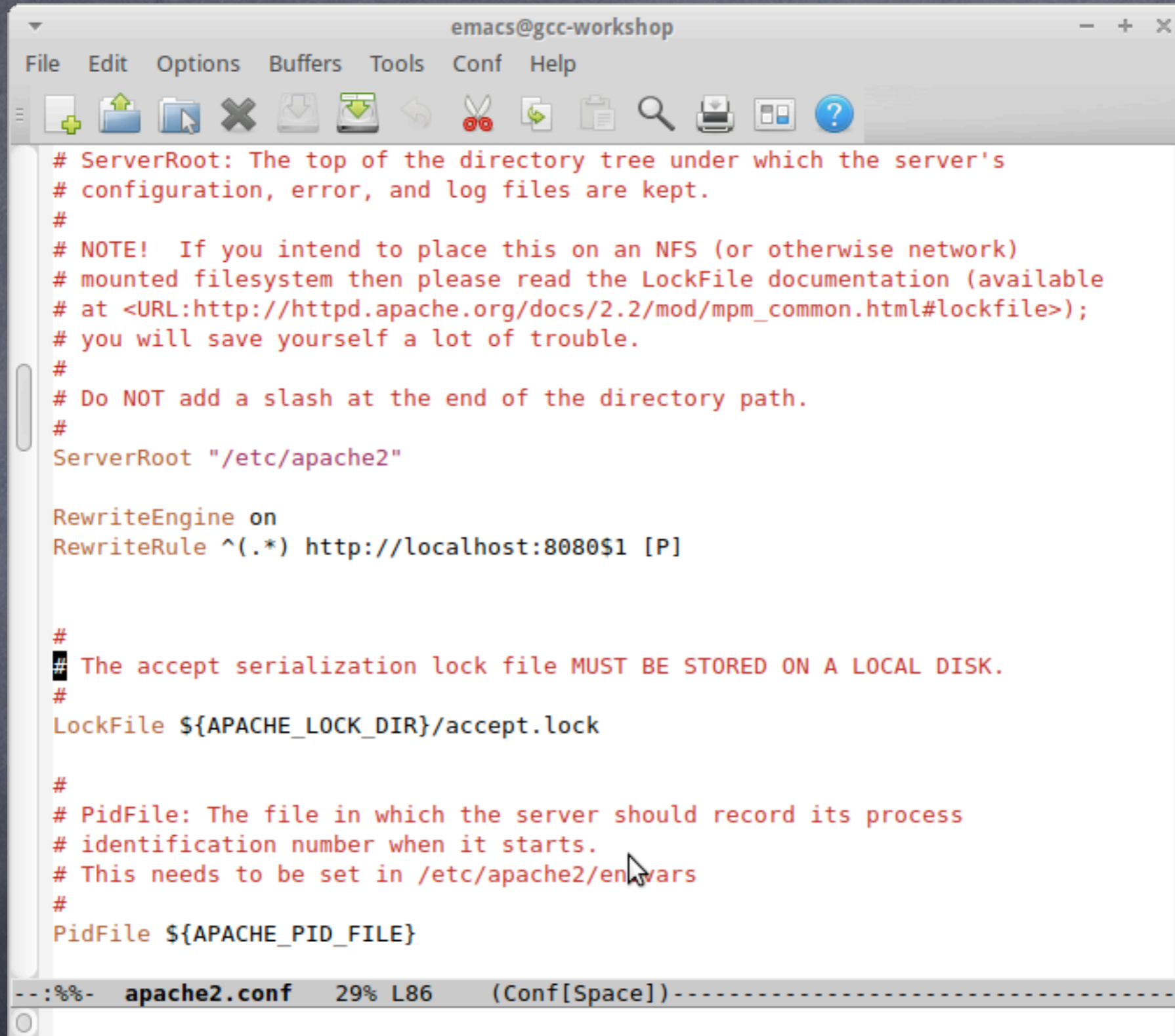
Apache Proxy config (5)

```
Terminal - gcc2013@gcc-workshop: ~
File Edit View Terminal Tabs Help
[Wed Jun 26 15:45:11 2013] [warn] module alias_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module auth_basic_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module authn_file_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module authz_default_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module authz_groupfile_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module authz_host_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module authz_user_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module autoindex_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module cgid_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module deflate_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module dir_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module env_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module mime_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module negotiation_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module reqtimeout_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module setenvif_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module status_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] The Alias directive in /etc/apache2/mods-available/alias.conf at line 15 will probably never match because it overlaps an earlier Alias.
apache2: Could not reliably determine the server's fully qualified domain name, using 127.0.1.1 for ServerName
httpd (pid 1849) already running
[ OK ]

gcc2013@gcc-workshop:~$ apache2 -V | grep conf
-D SERVER_CONFIG_FILE="apache2.conf"
gcc2013@gcc-workshop:~$ sudo emacs /etc/apache2/apache2.conf
```

We shall need to edit the main apache2 config file.

Apache Proxy config (6)



```
# ServerRoot: The top of the directory tree under which the server's
# configuration, error, and log files are kept.
#
# NOTE! If you intend to place this on an NFS (or otherwise network)
# mounted filesystem then please read the LockFile documentation (available
# at <URL:http://httpd.apache.org/docs/2.2/mod/mpm_common.html#lockfile>);
# you will save yourself a lot of trouble.
#
# Do NOT add a slash at the end of the directory path.
#
ServerRoot "/etc/apache2"

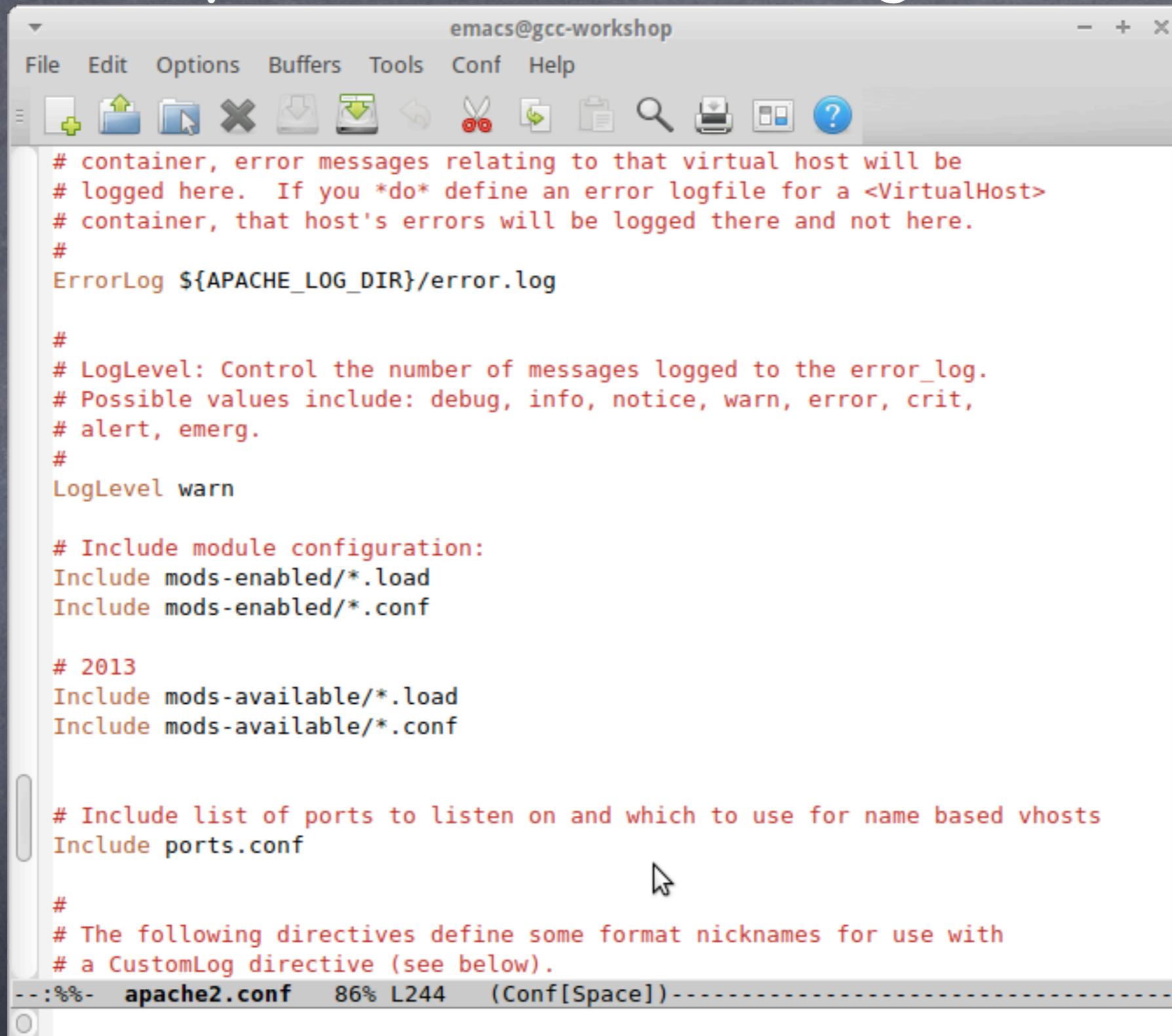
RewriteEngine on
RewriteRule ^(.*) http://localhost:8080$1 [P]

#
# The accept serialization lock file MUST BE STORED ON A LOCAL DISK.
#
LockFile ${APACHE_LOCK_DIR}/accept.lock

#
# PidFile: The file in which the server should record its process
# identification number when it starts.
# This needs to be set in /etc/apache2/envvars
#
PidFile ${APACHE_PID_FILE}
```

The re-write rule to enable the Apache proxy for Galaxy

Apache Proxy config (7)



```
# container, error messages relating to that virtual host will be
# logged here.  If you *do* define an error logfile for a <VirtualHost>
# container, that host's errors will be logged there and not here.
#
ErrorLog ${APACHE_LOG_DIR}/error.log

#
# LogLevel: Control the number of messages logged to the error_log.
# Possible values include: debug, info, notice, warn, error, crit,
# alert, emerg.
#
LogLevel warn

# Include module configuration:
Include mods-enabled/*.load
Include mods-enabled/*.conf

# 2013
Include mods-available/*.load
Include mods-available/*.conf

# Include list of ports to listen on and which to use for name based vhosts
Include ports.conf

#
# The following directives define some format nicknames for use with
# a CustomLog directive (see below).
--:%%- apache2.conf 86% L244 (Conf[Space])-----
```

Still on the main apache2 config file. Enabling the modules.

Galaxy config (1)

```
Terminal - gcc2013@gcc-workshop: ~/Documents/Galaxy
File Edit View Terminal Tabs Help
pping
[Wed Jun 26 15:45:11 2013] [warn] module authz_host_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module authz_user_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module autoindex_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module cgid_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module deflate_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module dir_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module env_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module mime_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module negotiation_module is already loaded, skipping
g
[Wed Jun 26 15:45:11 2013] [warn] module reqtimeout_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module setenvif_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module status_module is already loaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] The Alias directive in /etc/apache2/mods-available/a
alias.conf at line 15 will probably never match because it overlaps an earlier Alias.
apache2: Could not reliably determine the server's fully qualified domain name, using
127.0.1.1 for ServerName
httpd (pid 1849) already running

[ OK ]

gcc2013@gcc-workshop:~$ apache2 -V | grep conf
-D SERVER_CONFIG_FILE="apache2.conf"
gcc2013@gcc-workshop:~$ cd /home/gcc2013/Documents/
gcc2013@gcc-workshop:~/Documents$ ls
Galaxy
gcc2013@gcc-workshop:~/Documents$ cd Galaxy/
gcc2013@gcc-workshop:~/Documents/Galaxy$ ls
galaxy-dist
gcc2013@gcc-workshop:~/Documents/Galaxy$ sudo mkdir /home/galaxy
```

make a new directory /home/galaxy, as shown above

Galaxy config (2)

```
Terminal - gcc2013@gcc-workshop: /home
File Edit View Terminal Tabs Help
galaxy-dist
gcc2013@gcc-workshop:~/Documents/Galaxy$ cd /home/
gcc2013@gcc-workshop:/home$ ls -ls
total 8
4 drwxr-xr-x  8 gcc2013 gcc2013 4096 juni  26 10:31 galaxy
4 drwxr-xr-x 29 gcc2013 gcc2013 4096 juni  26 14:43 gcc2013
gcc2013@gcc-workshop:/home$ chown -R gcc2013:gcc2013 galaxy/
gcc2013@gcc-workshop:/home$ cp -rf /home/gcc2013/Documents/Galaxy/galaxy-dist/ .
```

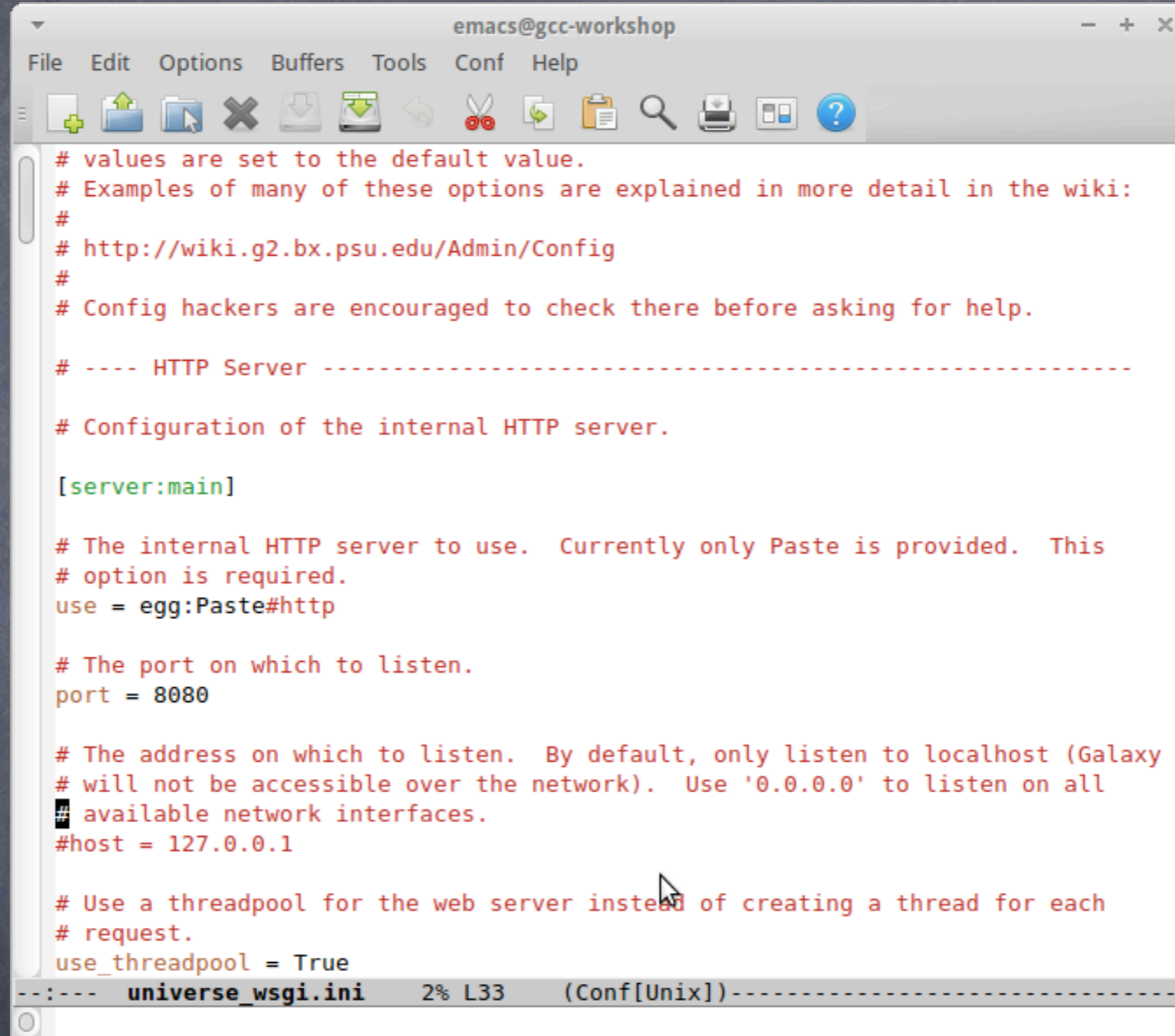
Copy the already existing code in galaxy-dist to the /home/galaxy directory. This is so we can keep the original copy in a clean state. In a real world scenario, you would do a Mercurial pull (hg pull), to get the latest and the greatest from the Galaxy repository.

Galaxy config (3)

```
Terminal - gcc2013@gcc-workshop: /home/galaxy/galaxy-dist
File Edit View Terminal Tabs Help
gcc2013@gcc-workshop:~/Documents/Galaxy$ ls
galaxy-dist
gcc2013@gcc-workshop:~/Documents/Galaxy$ cd /home/
gcc2013@gcc-workshop:/home$ ls -ls
total 8
4 drwxr-xr-x  8 gcc2013 gcc2013 4096 juni  26 10:31 galaxy
4 drwxr-xr-x 29 gcc2013 gcc2013 4096 juni  26 14:43 gcc2013
gcc2013@gcc-workshop:/home$ chown -R gcc2013:gcc2013 galaxy/
gcc2013@gcc-workshop:/home$ cd galaxy/galaxy-dist/
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist$ emacs universe_wsgi.ini &
```

(almost) Everything can be controlled by the galaxy-dist/universe_wsgi.ini file

Galaxy config (4)



```
# values are set to the default value.
# Examples of many of these options are explained in more detail in the wiki:
#
# http://wiki.g2.bx.psu.edu/Admin/Config
#
# Config hackers are encouraged to check there before asking for help.

# ----- HTTP Server -----

# Configuration of the internal HTTP server.

[server:main]

# The internal HTTP server to use. Currently only Paste is provided. This
# option is required.
use = egg:Paste#http

# The port on which to listen.
port = 8080

# The address on which to listen. By default, only listen to localhost (Galaxy
# will not be accessible over the network). Use '0.0.0.0' to listen on all
# available network interfaces.
#host = 127.0.0.1

# Use a threadpool for the web server instead of creating a thread for each
# request.
use_threadpool = True
--:--- universe_wsgi.ini 2% L33 (Conf[Unix])-----
```

Specify the main port (8080) for the python WSGI. See also slide number 20. The config between the two must be consistent!

Galaxy config (5)

```
#filter-with = proxy-prefix

# If proxy-prefix is enabled and you're running more than one Galaxy instance
# behind one hostname, you will want to set this to the same path as the prefix
# in the filter above. This value becomes the "path" attribute set in the
# cookie so the cookies from each instance will not clobber each other.
#cookie_path = None

# -- Database

# By default, Galaxy uses a SQLite database at 'database/universe.sqlite'. You
# may use a SQLAlchemy connection string to specify an external database
# instead. This string takes many options which are explained in detail in the
# config file documentation.
#database_connection = sqlite:///./database/universe.sqlite?isolation_level=IMME
DIATE
database_connection = postgres://gcc2013:12345@localhost:5432/galaxy

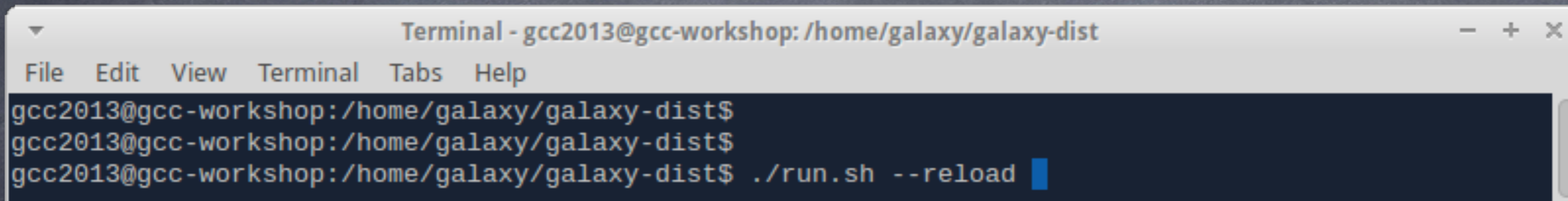
# If the server logs errors about not having enough database pool connections,
# you will want to increase these values, or consider running more Galaxy
# processes.
#database_engine_option_pool_size = 5
#database_engine_option_max_overflow = 10

# If using MySQL and the server logs the error "MySQL server has gone away",
# you will want to set this to some positive value (7200 should work).
#database_engine_option_pool_recycle = -1

---:--- universe_wsgi.ini 9% L81 (Conf[Unix])---
```

universe_wsgi.ini: The database_connection line must be consistent to your Postgres config (slide 14)

Galaxy config (6)



```
Terminal - gcc2013@gcc-workshop: /home/galaxy/galaxy-dist
File Edit View Terminal Tabs Help
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist$
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist$
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist$ ./run.sh --reload
```

If all is well, restart Galaxy and point your browser to:
to see your newly installed Galaxy server

Users, groups, roles, libraries and quotas (1)

User: A registered entity (via email and password) allowed to use the Galaxy environment.

Group: A group of users that can share datasets and workflow histories.

Role: An administrative view of a user/group over resources (datasets, quotas, etc)

Libraries: Data sets that can be shared amongst groups (permissions) or by everyone (public)

Quotas: Disk space is a valuable commodity. Set limits or have full servers and frustrated users.

Users, groups, roles, libraries and quotas (2)

Galaxy Administration

Analyze Data Workflow Shared Data Visualization Admin Help User

- Administration
- Security
 - Manage users
 - Manage groups
 - Manage roles
- Data
 - Manage quotas
 - Manage data libraries
 - Manage local data (beta)
- Server
 - View data types registry
 - View data tables registry
 - View tool lineage
 - Reload a tool's configuration
 - Profile memory usage
 - Manage jobs
 - Review tool migration stages
 - Reset metadata for tool shed repositories
 - Manage installed tool shed repositories
- Tool sheds
 - Search and browse tool sheds
- Form Definitions
 - Manage form definitions
- Sample Tracking
 - Manage sequencers and external services
 - Manage request types
 - Sequencing requests
 - Find samples

<input type="checkbox"/>	<input type="text" value="manuel.razo.m@gmail.com"/>	manuel-razo	0	1	no	Jan 26, 2012
<input type="checkbox"/>	<input type="text" value="mie231ds@gmail.com"/>	y1wod37ho	0	1	no	Nov 02, 2012
<input type="checkbox"/>	<input type="text" value="niceg.t.s.118@gmail.com"/>	cabnuandell	0	1	no	Nov 06, 2012
<input type="checkbox"/>	<input type="text" value="osalazar@lcg.unam.mx"/>	osalazar	0	1	no	Jan 26, 2012
<input type="checkbox"/>	<input type="text" value="ozono32@hotmail.com"/>	ozono32	0	1	no	Jan 26, 2012
<input type="checkbox"/>	<input type="text" value="quarkie68@yahoo.co.uk"/>	gharisson	0	1	no	Oct 26, 2012
<input type="checkbox"/>	<input type="text" value="rcappello@ecologia.unam.mx"/>	rcappello	0	1	no	Jan 27, 2012
<input type="checkbox"/>	<input type="text" value="regina_gama@hotmail.com"/>	reginahgama	0	1	no	Jan 27, 2012
<input type="checkbox"/>	<input type="text" value="roman.zapien@hotmail.com"/>	romanzapien	0	1	no	Jan 27, 2012
<input type="checkbox"/>	<input type="text" value="samendojohnss@aol.com"/>	guaapalod	0	1	no	Oct 28, 2012
<input type="checkbox"/>	<input type="text" value="scenesfromamemory4@gmail.com"/>	benjamin-tovar	0	1	no	Jan 26, 2012
<input type="checkbox"/>	<input type="text" value="skladarhm@mail.ru"/>	skladarh	0	1	no	Dec 05, 2012
<input type="checkbox"/>	<input type="text" value="slvvasquez1@gmail.com"/>	silviabio	0	1	no	Feb 01, 2012
<input type="checkbox"/>	<input type="text" value="s.p.a.r.s.elyqlo.q.x.dw@gmail.com"/>	chmsnhlb	0	1	no	Mar 22, 2013
<input type="checkbox"/>	<input type="text" value="s.p.a.rs.ely.q.lo.qxd.w@gmail.com"/>	brwdbqwzr	0	1	no	Mar 22, 2013
<input type="checkbox"/>	<input type="text" value="s.p.arse.l.yql.o.q.x.dw@gmail.com"/>	qzmphxvai	0	1	no	Mar 21, 2013
<input type="checkbox"/>	<input type="text" value="s.p.arsel.yql.o.q.x.dw@gmail.com"/>	rpyxzbqhlq	0	1	no	Mar 21, 2013
<input type="checkbox"/>	<input type="text" value="s.pa.r.sel.y.qlo.qxdw@gmail.com"/>	duwhqqbct	0	1	no	Mar 22, 2013
<input type="checkbox"/>	<input type="text" value="s.par.s.e.l.y.q.lo.q.x.dw@gmail.com"/>	kostiqlzavx	0	1	no	Mar 23, 2013
<input type="checkbox"/>	<input type="text" value="s.par.s.e.l.y.q.l.o.qxdw@gmail.com"/>	xjhgltwxdfe	0	1	no	Mar 23, 2013
<input type="checkbox"/>	<input type="text" value="toni.hurtado@ncmm.uio.no"/>	tonih	0	1	no	Feb 17, 2012
<input type="checkbox"/>	<input type="text" value="trine.rounge@krefregisteret.no"/>	trine-b-rounge	0	2	no	Jan 17, 2013
<input type="checkbox"/>	<input type="text" value="wong2hikonrii@gmail.com"/>	engibbono	0	1	no	Oct 26, 2012
<input type="checkbox"/>	<input type="text" value="zameloon1487@gmail.com"/>	zame1487	0	1	no	Jan 26, 2012

For 0 selected items:

Users, groups, roles, libraries and quotas (3)

Galaxy Analyze Data Workflow Shared Data Visualization Admin

Administration

- Security
 - Manage users
 - Manage groups
 - Manage roles
- Data
 - Manage quotas
 - Manage data libraries
 - Manage local data (beta)
- Server
 - View data types registry
 - View data tables registry
 - View tool lineage
 - Reload a tool's configuration
 - Profile memory usage
 - Manage jobs

Group 'Ian Mills Data Group' is currently associated with 1 roles and 3 users

Group 'Ian Mills Data Group'

Roles associated with 'Ian Mills Data Group'

Ian Mills Data Group

>>

Roles not associated with 'Ian Mills Data Group'

<<

Users associated with 'Ian Mills Data Group'

gmagklaras@gmail.com
ian.mills@ncmm.uio.no
i.g.mills@ncmm.uio.no

>>

Users not associated with 'Ian Mills Data Group'

<<

Save

Users, groups, roles, libraries and quotas (4)

Role 'Ian Mills Data Group'

Users associated with 'Ian Mills Data Group'

Users not associated with 'Ian Mills Data Group'

Groups associated with 'Ian Mills Data Group'

Groups not associated with 'Ian Mills Data Group'


Save

Data library datasets associated with role 'Ian Mills Data Group'

- Mills Lib1
 - Mills Lib1 / ftp://dias.uio.no/millsftp/LNCaPInpR_GCCAAT_L005_R1.fastq
 - access
 - Mills Lib1 / ftp://dias.uio.no/millsftp/VCaPInpE_CTTGTA_L005_R1.fastq
 - access
 - Mills Lib1 / ftp://dias.uio.no/millsftp/LNCaPMYCE_ACAGTG_L006_R1.fastq
 - access
 - Mills Lib1 / ftp://dias.uio.no/millsftp/VCaPMYCE_CTTGTA_L006_R1.fastq
 - access
 - Mills Lib1 / ftp://ftp.no.embnet.org/biodatabases/embl_release/rel_con_env_07_r110.dat
 - access
 - Mills Lib1 / ftp://dias.uio.no/millsftp/LNCaPMYCR_GCCAAT_L006_R1.fastq
 - access
 - Mills Lib1 / ftp://dias.uio.no/millsftp/VCaPMYCR_GTGAAA_L006_R1.fastq
 - access
 - Mills Lib1 / ftp://dias.uio.no/millsftp/LNCaPInpE_ACAGTG_L005_R1.fastq
 - access
 - Mills Lib1 / ftp://dias.uio.no/millsftp/VCaPInpR_GTGAAA_L005_R1.fastq
 - access

Users, groups, roles, libraries and quotas (5)

Data Libraries



[Advanced Search](#)

<input type="checkbox"/> Data library name	Data library description	Created	Last Updated
<input type="checkbox"/> Escherichia coli	UNAM Course Talleres 2012	Jan 21, 2012	Jan 21, 2012
<input type="checkbox"/> Human reads	Human reads FASTQ demo	Jan 21, 2012	Jan 21, 2012
<input type="checkbox"/> Mills BGI	BGI data for the Mills group	Jan 09, 2013	Jan 09, 2013
<input type="checkbox"/> Mills Lib1	Lib1 Fast Chip-Seq	Jan 09, 2013	Jan 09, 2013
<input type="checkbox"/> Reference Genomes		Jan 09, 2013	Jan 09, 2013
<input type="checkbox"/> test4		Jan 26, 2012	Jan 26, 2012
<input type="checkbox"/> trine01	Methylation analysis for Trine Rounge	Jan 14, 2013	Jan 14, 2013
<input type="checkbox"/> Uniprot Fasta		Oct 25, 2012	Oct 25, 2012
<input type="checkbox"/> Viral influenza		Jan 22, 2012	Jan 22, 2012

For 0 selected libraries:

Data Library "Escherichia coli"

Containing the E. Coli reference genome

<input type="checkbox"/> Name	Message	Data type	Date uploaded
<input type="checkbox"/> AP012306.fasta		fasta	2012-01-21
<input type="checkbox"/> SRR001666_1.fastq		fastq	2012-01-21

For selected datasets:

i TIP: You can download individual library datasets by selecting "Download this dataset" from the context menu (triangle) next to each dataset's name.

i TIP: Several compression options are available for downloading multiple library datasets simultaneously:

- gzip: Recommended for fast network connections
- bzip2: Recommended for slower network connections (smaller size but takes longer to compress)
- zip: Not recommended but is provided as an option for those who cannot open the above formats

Users, groups, roles, libraries and quotas (6)

Create quota

Name:**Description:****Amount**

Examples: "10000MB", "99 gb", "0.2T", "unlimited"

Assign, increase by amount, or decrease by amount? **Is this quota a default for a class of users (if yes, what type)?**

Warning: Any user or group associations selected below will be ignored if this quota is used as a default.

Users associated with new quota

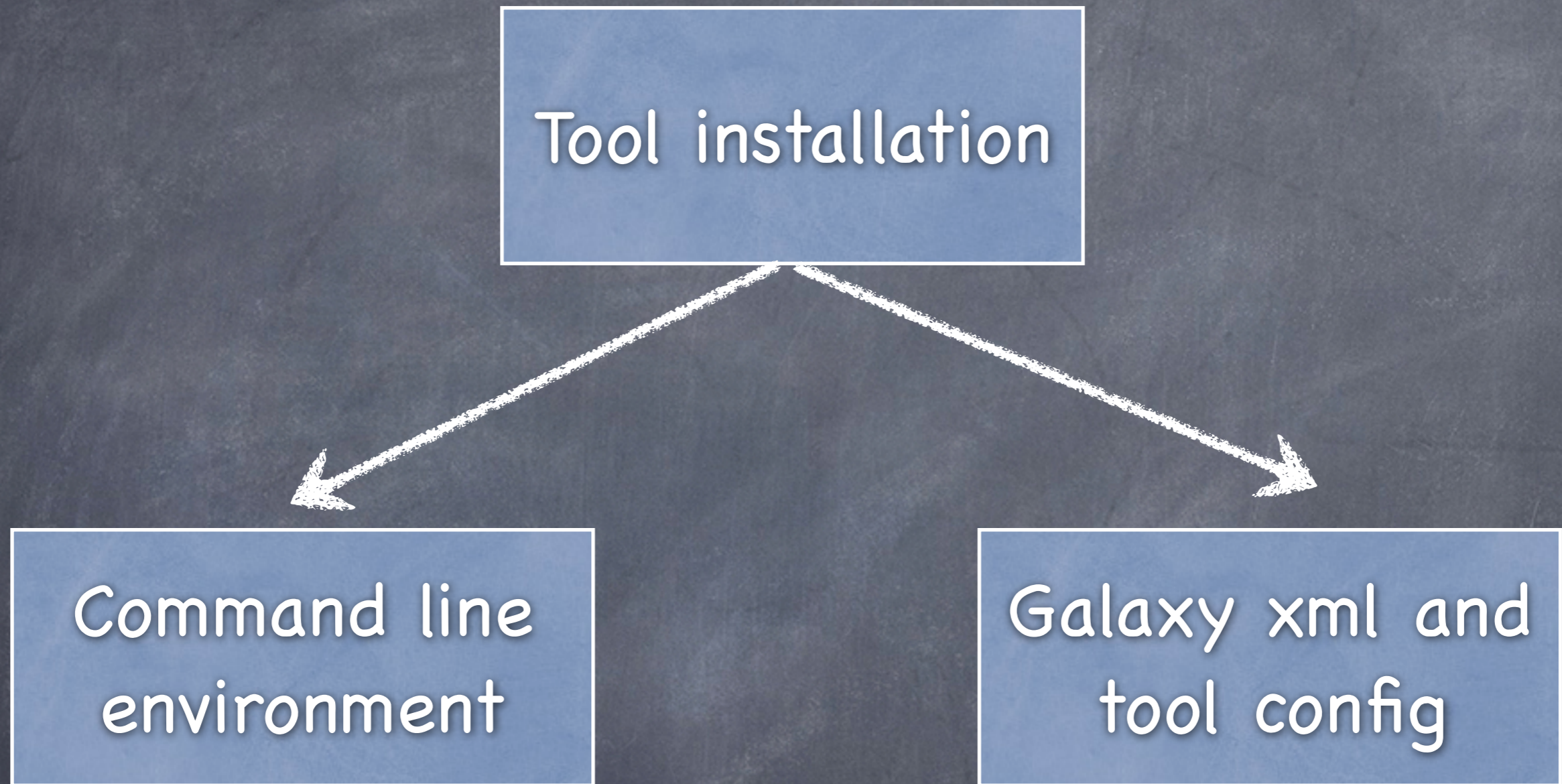
Users not associated with new quota**Groups associated with new quota****Groups not associated with new quota**

Installing Galaxy tools

i) NCBI BLAST+

ii) write your own tool and install it

Installing Galaxy tools (1)



Installing Galaxy tools (2)

```
Terminal - gcc2013@gcc-workshop: ~/Downloads/blastfiles
File Edit View Terminal Tabs Help
gcc2013@gcc-workshop:~$ cd
gcc2013@gcc-workshop:~$ cd Downloads/
gcc2013@gcc-workshop:~/Downloads$ mkdir blastfiles
gcc2013@gcc-workshop:~/Downloads$ cd blastfiles
gcc2013@gcc-workshop:~/Downloads/blastfiles$ wget ftp://ftp.no.embnet.org/galaxy/ncbi-blast-2.2.28+-ia32-linux.tar.gz
--2013-06-28 08:40:13-- ftp://ftp.no.embnet.org/galaxy/ncbi-blast-2.2.28+-ia32-linux.tar.gz
      => 'ncbi-blast-2.2.28+-ia32-linux.tar.gz'
Resolving ftp.no.embnet.org (ftp.no.embnet.org)... 129.240.235.130
Connecting to ftp.no.embnet.org (ftp.no.embnet.org)|129.240.235.130|:21... connected.
Logging in as anonymous ... Logged in!
==> SYST ... done.      ==> PWD ... done.
==> TYPE I ... done.   ==> CWD (1) /galaxy ... done.
==> SIZE ncbi-blast-2.2.28+-ia32-linux.tar.gz ... 167568023
==> PASV ... done.     ==> RETR ncbi-blast-2.2.28+-ia32-linux.tar.gz ... done.
Length: 167568023 (160M) (unauthoritative)

100%[=====>] 167 568 023 2,24MB/s   in 72s

2013-06-28 08:41:25 (2,22 MB/s) - 'ncbi-blast-2.2.28+-ia32-linux.tar.gz' saved [167568023]

gcc2013@gcc-workshop:~/Downloads/blastfiles$
```

Fetch the blast 32-bit binaries by FTP

Installing Galaxy tools (3)

Fetch
the BLAST
database and
tool tarballs
by
FTP

```
Terminal - gcc2013@gcc-workshop: ~/Downloads/blastfiles
File Edit View Terminal Tabs Help
gcc2013@gcc-workshop:~/Downloads/blastfiles$ wget ftp://ftp.no.embnet.org/galaxy/pataasmall.tar.gz
--2013-06-28 08:42:39-- ftp://ftp.no.embnet.org/galaxy/pataasmall.tar.gz
      => 'pataasmall.tar.gz'
Resolving ftp.no.embnet.org (ftp.no.embnet.org)... 129.240.235.130
Connecting to ftp.no.embnet.org (ftp.no.embnet.org)|129.240.235.130|:21... connected.
Logging in as anonymous ... Logged in!
==> SYST ... done.      ==> PWD ... done.
==> TYPE I ... done.    ==> CWD (1) /galaxy ... done.
==> SIZE pataasmall.tar.gz ... 4735073
==> PASV ... done.     ==> RETR pataasmall.tar.gz ... done.
Length: 4735073 (4,5M) (unauthoritative)

100%[=====>] 4 735 073    2,25MB/s    in 2,0s

2013-06-28 08:42:42 (2,25 MB/s) - 'pataasmall.tar.gz' saved [4735073]

gcc2013@gcc-workshop:~/Downloads/blastfiles$ wget ftp://ftp.no.embnet.org/galaxy/blast_tool.tar.gz
--2013-06-28 08:43:18-- ftp://ftp.no.embnet.org/galaxy/blast_tool.tar.gz
      => 'blast_tool.tar.gz'
Resolving ftp.no.embnet.org (ftp.no.embnet.org)... 129.240.235.130
Connecting to ftp.no.embnet.org (ftp.no.embnet.org)|129.240.235.130|:21... connected.
Logging in as anonymous ... Logged in!
==> SYST ... done.      ==> PWD ... done.
==> TYPE I ... done.    ==> CWD (1) /galaxy ... done.
==> SIZE blast_tool.tar.gz ... 4822
==> PASV ... done.     ==> RETR blast_tool.tar.gz ... done.
Length: 4822 (4,7K) (unauthoritative)

100%[=====>] 4 822          --.-K/s    in 0,002s

2013-06-28 08:43:18 (1,90 MB/s) - 'blast_tool.tar.gz' saved [4822]

gcc2013@gcc-workshop:~/Downloads/blastfiles$
```

Installing Galaxy tools (4)

```
Terminal - gcc2013@gcc-workshop: ~/db
File Edit View Terminal Tabs Help
gcc2013@gcc-workshop:~$ cd
gcc2013@gcc-workshop:~$ mkdir db
gcc2013@gcc-workshop:~$ cd db
gcc2013@gcc-workshop:~/db$ mv ~/Downloads/blastfiles/pataasmall.tar.gz .
gcc2013@gcc-workshop:~/db$ tar xvzf pataasmall.tar.gz
pataasmall.phr
pataasmall.pin
pataasmall.psq
gcc2013@gcc-workshop:~/db$
```

Install the sample BLAST database

Installing Galaxy tools (5)

```
Terminal - gcc2013@gcc-workshop: /home/galaxy/galaxy-dist/tools/ncbi_blast_plus
File Edit View Terminal Tabs Help
gcc2013@gcc-workshop:~$ cd
gcc2013@gcc-workshop:~$ cd Downloads/blastfiles
gcc2013@gcc-workshop:~/Downloads/blastfiles$ tar xvzf blast_tool.tar.gz
hide_stderr.py
ncbi_blastp_wrapper.xml
query.fa
tool_conf_section.xml
gcc2013@gcc-workshop:~/Downloads/blastfiles$ cd /home/galaxy/galaxy-dist/tools
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist/tools$ mkdir ncbi_blast_plus
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist/tools$ cd ncbi_blast_plus
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist/tools/ncbi_blast_plus$ cp ~/Downlo
ads/blastfiles/ncbi_blastp_wrapper.xml .
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist/tools/ncbi_blast_plus$ cp ~/Downlo
ads/blastfiles/hide_stderr.py .
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist/tools/ncbi_blast_plus$ ls -l
total 20
-rwxr-xr-x 1 gcc2013 gcc2013 1803 juni 28 08:56 hide_stderr.py
-rw-r--r-- 1 gcc2013 gcc2013 14060 juni 28 08:55 ncbi_blastp_wrapper.xml
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist/tools/ncbi_blast_plus$
```

Navigate to the galaxy-dist/tools directory and make the tool directory entry

Installing Galaxy tools (5)

```
emacs@gcc-workshop
File Edit Options Buffers Tools Help
#This is a sample file distributed with Galaxy that is used to define a
#list of protein BLAST databases, using three columns tab separated
#(longer whitespace are TAB characters):
#
#<unique_id>    <database_caption>    <base_name_path>
#
#The captions typically contain spaces and might end with the build date.
#It is important that the actual database name does not have a space in it,
#and that the first tab that appears in the line is right before the path.
#
#So, for example, if your database is NR and the path to your base name
#is /data/blastdb/nr, then the blastdb_p.loc entry would look like this:
#
#nr            NCBI NR (non redundant)    /data/blastdb/nr
pataasmall    custom pataa /home/gcc2013/db
#
#and your /data/blastdb directory would contain all of the files associated
#with the database, /data/blastdb/nr.*.
#
#Your blastdb_p.loc file should include an entry per line for each "base name"
#you have stored. For example:
#
#nr_05Jun2010  NCBI NR (non redundant) 05 Jun 2010    /data/blastdb/05
Jun2010/nr
#nr_15Aug2010  NCBI NR (non redundant) 15 Aug 2010    /data/blastdb/15
Aug2010/nr
#...etc...
--:--- blastdb_p.loc Top L1 (Fundamental)-----
Welcome to GNU Emacs, one component of the GNU/Linux operating system.
[Emacs Tutorial] Learn basic keystroke commands
[Emacs Guided Tour] Overview of Emacs features at gnu.org
-U:%%- *GNU Emacs* Top L3 (Fundamental)-----
```

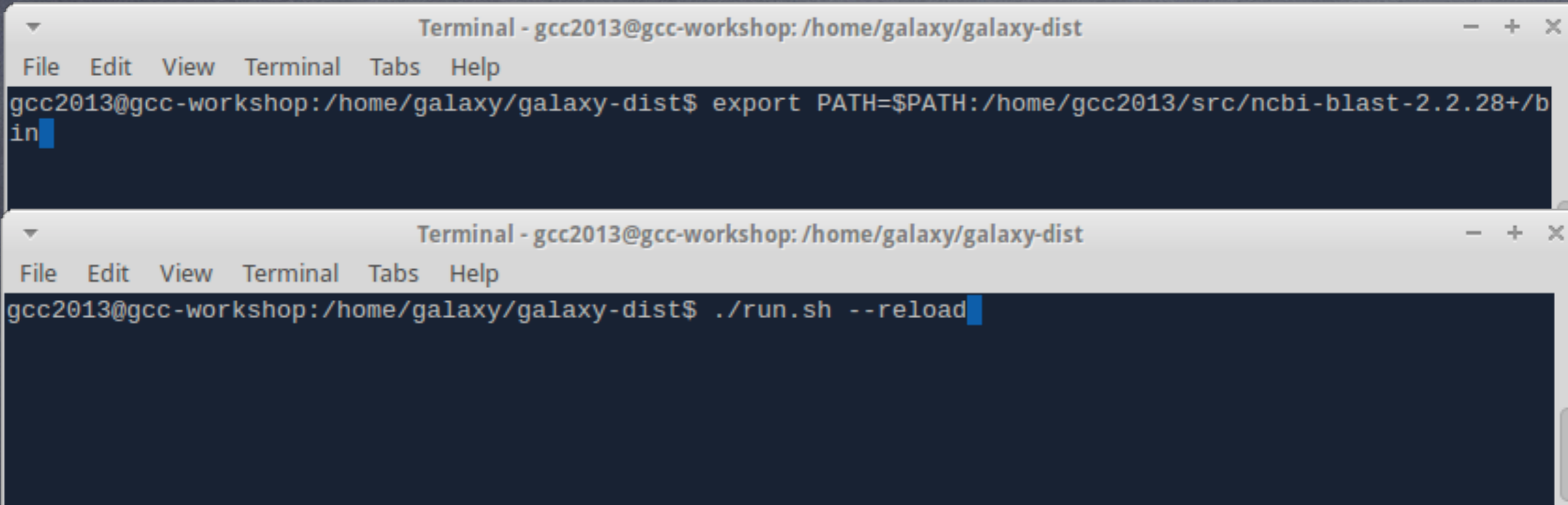
Here you define the available databases that can be used from the Galaxy environment.

Installing Galaxy tools (6)

```
Terminal - gcc2013@gcc-workshop: /home/galaxy/galaxy-dist/tool-data
File Edit View Terminal Tabs Help
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist/tools/ncbi_blast_plus$ cd ../../
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist$ cd tool-data/
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist/tool-data$ ls -l blastdb_p.loc
-rw-rw-r-- 1 gcc2013 gcc2013 1124 juni 25 08:59 blastdb_p.loc
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist/tool-data$ emacs blastdb_p.loc
```

Navigate to the galaxy-dist/tool-data dir and check out the blastdb_p.loc file

Installing Galaxy tools (8)



The image shows two terminal windows. The top window has a title bar 'Terminal - gcc2013@gcc-workshop: /home/galaxy/galaxy-dist' and a menu bar 'File Edit View Terminal Tabs Help'. The command entered is 'export PATH=\$PATH:/home/gcc2013/src/ncbi-blast-2.2.28+/bin'. The bottom window has the same title bar and menu bar. The command entered is './run.sh --reload'.

```
Terminal - gcc2013@gcc-workshop: /home/galaxy/galaxy-dist
File Edit View Terminal Tabs Help
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist$ export PATH=$PATH:/home/gcc2013/src/ncbi-blast-2.2.28+/bin

Terminal - gcc2013@gcc-workshop: /home/galaxy/galaxy-dist
File Edit View Terminal Tabs Help
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist$ ./run.sh --reload
```

Make sure that the newly installed NCBI BLAST+ binaries are in your PATH environment and then restart Galaxy to make the new PATH effective.

Installing Galaxy tools (9)

The screenshot shows the Galaxy web interface. The main content area is titled "Upload File (version 1.1.3)". It features several input fields and options:

- File Format:** A dropdown menu set to "fasta". Below it, the text reads "Which format? See help below".
- File:** A text input field containing "/home/gcc2013/Downloads" and a "Browse..." button. Below this, a tip states: "TIP: Due to browser limitations, uploading files larger than 2GB is guaranteed to fail. To upload large files, use the URL method (below) or FTP (if enabled by the site administrator)."
- URL/Text:** A large empty text area. Below it, the text reads: "Here you may specify a list of URLs (one per line) or paste the contents of a file."
- Convert spaces to tabs:** A checkbox labeled "Yes" which is currently unchecked. Below it, the text reads: "Use this option if you are entering intervals by hand."
- Genome:** A dropdown menu set to "unspecified (?)".
- Execute:** A blue button at the bottom of the form.

The left sidebar contains a "Tools" section with a search bar and a list of tools under categories like "NCBI BLAST+", "MyTools", and "Get Data". The right sidebar shows a "History" panel with two entries: "2: demo script on infile.txt" and "1: infile.txt".

Fire up your VM's web browser on <http://127.0.0.1/> and upload the query.fa file

Installing Galaxy tools (10)

The screenshot shows the Galaxy web interface with the 'NCBI BLAST+ blastp (version 0.0.10)' tool selected. The interface is divided into three main sections: Tools, the tool configuration panel, and History.

Tools Panel (Left): Contains a search bar and a list of tools under 'NCBI BLAST+' and 'MyTools'. The 'NCBI BLAST+' section includes 'NCBI BLAST+ blastp Search protein database with protein query sequence(s)'. The 'MyTools' section lists various data sources and browsers like 'UCSC Main table browser', 'UCSC Test table browser', 'UCSC Archaea table browser', 'BX table browser', 'EBI SRA ENA SRA', 'Get Microbial Data', 'BioMart Central server', 'BioMart Test server', 'CBI Rice Mart rice mart', 'GrameneMart Central server', 'modENCODE fly server', and 'Flymine server'.

Tool Configuration Panel (Center): Shows the configuration for 'NCBI BLAST+ blastp (version 0.0.10)'. The settings are as follows:

- Protein query sequence(s):** 4: query.fa
- Subject database/sequences:** BLAST Database
- Protein BLAST database:** custom pataa db
- Type of BLAST:** blastp, blastp-short
- Set expectation value cutoff:** 0.001
- Output format:** Tabular (standard 12 columns)
- Advanced Options:** Hide Advanced Options

A blue 'Execute' button is visible at the bottom of the configuration panel. A warning note at the bottom states: 'Note. Database searches may take a substantial amount of time. For large input datasets it is advisable to allow overnight processing.'

History Panel (Right): Shows a list of jobs. The top job is '4: query.fa' with 287 bytes, which is highlighted in green. Below it is '2: demo script on infile.txt' with 1 line of output, also highlighted in green. The output for this job is visible: 'Hello tutorial participant! This Galax'. The bottom job is '1: infile.txt'.

Now run your BLAST+ query!

Installing Galaxy tools (11)

The screenshot shows the Galaxy web interface. The top navigation bar includes 'Galaxy', 'Analyze Data', 'Workflow', 'Shared Data', 'Visualization', 'Help', and 'User'. The main area is divided into three panels: 'Tools' on the left, a central data table, and 'History' on the right. The 'Tools' panel lists various categories like 'NCBI BLAST+', 'MyTools', 'Get Data', etc. The central table shows a single row of data. The 'History' panel shows a sequence of steps, with the most recent step being '9: blastp on db'. The bottom search bar contains the text 'ubuntu'.

unnamed	gi 91146441 gb ABE22103.1	100.00	80	0	0	1	80	161

History

- Unnamed history
433 bytes
- 9: blastp on db
- 4: query.fa
- 2: demo script on infile.txt
1 line
format text, database: ?
Hello tutorial participant! This Galax
- 1: infile.txt

Find: ubuntu

Previous Next Highlight all Match case Phrase not found

If you get this result, congratulations, you just installed your first tool in Galaxy!

Installing Galaxy tools (12)

```
Terminal - gcc2013@gcc-workshop: ~/Downloads
File Edit View Terminal Tabs Help
gcc2013@gcc-workshop:~$ cd
gcc2013@gcc-workshop:~$ cd Downloads
gcc2013@gcc-workshop:~/Downloads$ wget ftp://ftp.no.embnet.org/galaxy/toolfiles.tar.gz
--2013-06-28 08:34:55-- ftp://ftp.no.embnet.org/galaxy/toolfiles.tar.gz
=> 'toolfiles.tar.gz'
Resolving ftp.no.embnet.org (ftp.no.embnet.org)... 129.240.235.130
Connecting to ftp.no.embnet.org (ftp.no.embnet.org)|129.240.235.130|:21... connected.
Logging in as anonymous ... Logged in!
==> SYST ... done.      ==> PWD ... done.
==> TYPE I ... done.   ==> CWD (1) /galaxy ... done.
==> SIZE toolfiles.tar.gz ... 757
==> PASV ... done.     ==> RETR toolfiles.tar.gz ... done.
Length: 757 (unauthoritative)

100%[=====>] 757          --.-K/s   in 0s

2013-06-28 08:34:55 (1,66 MB/s) - 'toolfiles.tar.gz' saved [757]

gcc2013@gcc-workshop:~/Downloads$ tar xvzf toolfiles.tar.gz
toolfiles/
toolfiles/helloVM.pl
toolfiles/tool_conf.xml
toolfiles/infile.txt
toolfiles/helloVM.xml
gcc2013@gcc-workshop:~/Downloads$
```

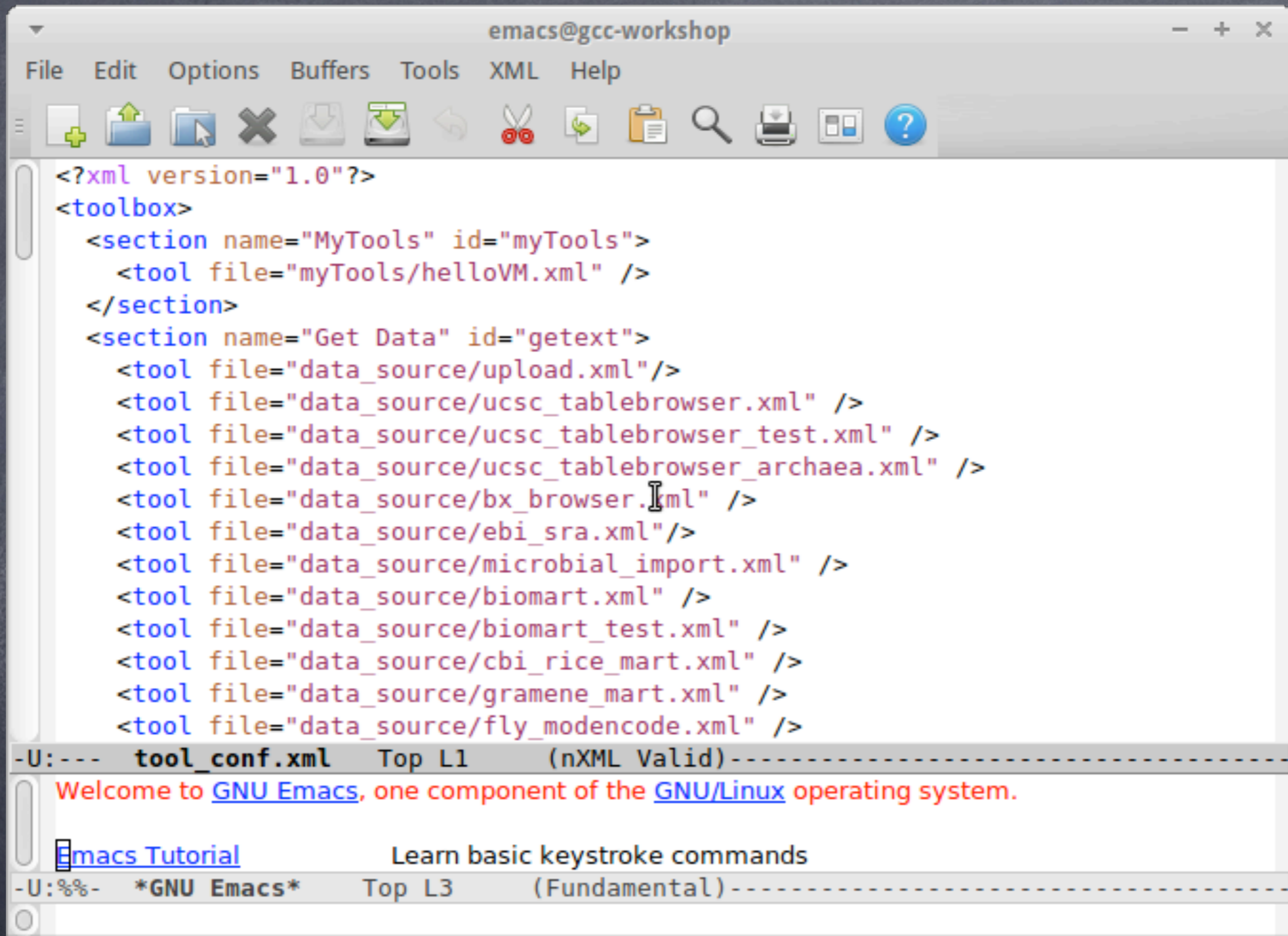
What about writing your own tool and enabling it in Galaxy? Just fetch the files as shown above.

Installing Galaxy tools (13)

```
Terminal - gcc2013@gcc-workshop: /home/galaxy/galaxy-dist/tools/myTools
File Edit View Terminal Tabs Help
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist$ cd tools
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist/tools$ mkdir myTools
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist/tools$ cd myTools/
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist/tools/myTools$ cp ~/Downloads/toolfiles/helloVM.* .
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist/tools/myTools$ chmod a+x helloVM.pl
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist/tools/myTools$ ls -l
total 8
-rwxrwxr-x 1 gcc2013 gcc2013 366 juni 25 10:50 helloVM.pl
-rw-rw-r-- 1 gcc2013 gcc2013 453 juni 25 10:50 helloVM.xml
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist/tools/myTools$
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist/tools/myTools$ cd /home/galaxy/galaxy-dist/
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist$ more ~/Downloads/toolfiles/tool_conf.xml
<section name="MyTools" id="myTools">
  <tool file="myTools/helloVM.xml" />
</section>
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist$ emacs tool_conf.xml
```

The procedure is the same to the one we followed with NCBI BLAST+. Here you have a simple Perl script.

Installing Galaxy tools (14)



The image shows a screenshot of the Emacs editor window titled "emacs@gcc-workshop". The window contains XML code for a Galaxy tool configuration file. The code is as follows:

```
<?xml version="1.0"?>
<toolbox>
  <section name="MyTools" id="myTools">
    <tool file="myTools/helloVM.xml" />
  </section>
  <section name="Get Data" id="gettext">
    <tool file="data_source/upload.xml"/>
    <tool file="data_source/ucsc_tablebrowser.xml" />
    <tool file="data_source/ucsc_tablebrowser_test.xml" />
    <tool file="data_source/ucsc_tablebrowser_archaea.xml" />
    <tool file="data_source/bx_browser.xml" />
    <tool file="data_source/ebi_sra.xml"/>
    <tool file="data_source/microbial_import.xml" />
    <tool file="data_source/biomart.xml" />
    <tool file="data_source/biomart_test.xml" />
    <tool file="data_source/cbi_rice_mart.xml" />
    <tool file="data_source/gramene_mart.xml" />
    <tool file="data_source/fly_modencode.xml" />
  </section>
</toolbox>
```

Below the code, the Emacs status bar shows the file name "tool_conf.xml" and the mode "Top L1 (nXML Valid)". A message box displays the text: "Welcome to GNU Emacs, one component of the GNU/Linux operating system." Below this, there is a link to "Emacs Tutorial" and the text "Learn basic keystroke commands". The status bar at the bottom shows "*GNU Emacs*" and the mode "Top L3 (Fundamental)".

Editing galaxy-dist/tool-data/tool_conf.xml file.

Installing Galaxy tools (15)

The screenshot shows the Galaxy web interface. At the top, the navigation bar includes 'Analyze Data', 'Workflow', 'Shared Data', 'Visualization', 'Help', and 'User'. The top right corner indicates 'Using 0 bytes'. On the left, the 'Tools' panel is visible with a search bar and a list of tool categories: MyTools, Get Data, Send Data, ENCODE Tools, Lift-Over, Text Manipulation, Filter and Sort, Join, Subtract and Group, Convert Formats, Extract Features, Fetch Sequences, Fetch Alignments, Get Genomic Scores, Operate on Genomic Intervals, Statistics, Wavelet Analysis, Graph/Display Data, Regional Variation, Multiple regression, Multivariate Analysis, and Evolution. The main workspace displays a green notification box with a checkmark and the text 'Hello world! It's running...' and 'To customize this page edit static/welcome.html'. Below this is a workflow diagram titled 'WWFSMD? grow noodly appendages...' from usegalaxy.org. The workflow consists of several tools: two 'Input dataset' tools, a 'Filter' tool, a 'Join' tool (highlighted with a blue box), a 'Group' tool, a 'Sort' tool, a 'Join two Queries' tool, and a 'Select first' tool. The right-hand 'History' panel shows 'Unnamed history' with '0 bytes' and a message: 'Your history is empty. Click 'Get Data' on the left pane to start'.

Restart Galaxy.

Can you spot the new tool on the left?

Installing Galaxy tools (16)

The screenshot displays the Galaxy web interface. At the top, the navigation bar includes 'Galaxy', 'Analyze Data', 'Workflow', 'Shared Data', 'Visualization', 'Help', and 'User'. The top right corner shows 'Using 21 bytes'. The left sidebar contains a 'Tools' section with a search bar and a list of tools under 'MyTools' and 'Get Data'. The main content area shows a tool named 'demo script (version 1.0.0)'. Under 'Source file:', there is a dropdown menu with '1: infile.txt' selected. Below this is a blue 'Execute' button. The tool's description reads: 'This tool is to illustrate a simple XML tool definition file.' The right sidebar shows a 'History' section with 'Unnamed history' (21 bytes) and a single entry '1: infile.txt' which is highlighted in green and has an eye icon.

Upload the infile.txt into your history and Execute.

Installing Galaxy tools (17)

The screenshot displays the Galaxy web interface. At the top, the navigation bar includes 'Galaxy' and menu items: 'Analyze Data', 'Workflow', 'Shared Data', 'Visualization', 'Help', and 'User'. The top right corner shows 'Using 125 bytes'.

On the left, the 'Tools' panel is visible, featuring a search bar and two sections: 'MyTools' with a link to 'demo script for Galaxy tutorial', and 'Get Data' with various data sources like 'Upload File from your computer', 'UCSC Main table browser', etc.

The central workspace contains a green notification box with a checkmark icon. The text reads: 'The following job has been successfully added to the queue: 2: demo script on infile.txt'. Below this, it states: 'You can check the status of queued jobs and view the resulting data by refreshing the History pane. When the job has been run the status will change from 'running' to 'finished' if completed successfully or 'error' if problems were encountered.'

On the right, the 'History' panel shows a list of jobs. The top entry is '2: demo script on infile.txt' with a size of '125 bytes'. It shows '1 line' of output in 'text' format, with a preview of the text: 'Hello tutorial participant! This Galax'. Below it is the input file '1: infile.txt'.

The execution of the demo script tool.

Keeping Galaxy up-to-date

Galaxy uses Mercurial for software distribution

<http://mercurial.selenic.com/>

and

<http://mercurial.selenic.com/wiki/Tutorial>

Galaxy upgrade (1)

```
Terminal - gcc2013@gcc-workshop: /home/galaxy_upgrade_howto
File Edit View Terminal Tabs Help
gcc2013@gcc-workshop:~$ pwd
/home/gcc2013
gcc2013@gcc-workshop:~$ sudo mkdir /home/galaxy_upgrade_howto
[sudo] password for gcc2013:
gcc2013@gcc-workshop:~$ ls -ls /home/
total 12
4 drwxr-xr-x  3 gcc2013 gcc2013 4096 juni  27 10:05 galaxy
4 drwxr-xr-x  2 root    root    4096 juni  27 10:24 galaxy_upgrade_howto
4 drwxr-xr-x 29 gcc2013 gcc2013 4096 juni  27 10:03 gcc2013
gcc2013@gcc-workshop:~$ sudo chown -R gcc2013:gcc2013 /home/galaxy_upgrade_howto/
gcc2013@gcc-workshop:~$ cd /home/galaxy_upgrade_howto/
gcc2013@gcc-workshop:/home/galaxy_upgrade_howto$
```

Make a new dir and ensure it has the right ownership/permissions

Galaxy upgrade (2)

```
Terminal - gcc2013@gcc-workshop: /home/galaxy_upgrade_howto
File Edit View Terminal Tabs Help
gcc2013@gcc-workshop:~$ pwd
/home/gcc2013
gcc2013@gcc-workshop:~$ sudo mkdir /home/galaxy_upgrade_howto
[sudo] password for gcc2013:
gcc2013@gcc-workshop:~$ ls -ls /home/
total 12
4 drwxr-xr-x  3 gcc2013 gcc2013 4096 juni  27 10:05 galaxy
4 drwxr-xr-x  2 root    root    4096 juni  27 10:24 galaxy_upgrade_howto
4 drwxr-xr-x 29 gcc2013 gcc2013 4096 juni  27 10:03 gcc2013
gcc2013@gcc-workshop:~$ sudo chown -R gcc2013:gcc2013 /home/galaxy_upgrade_howto/
gcc2013@gcc-workshop:~$ cd /home/galaxy_upgrade_howto/
gcc2013@gcc-workshop:/home/galaxy_upgrade_howto$ hg clone -r release_2013.01.13 http://bitbucket.org/galaxy/galaxy-dist
real URL is https://bitbucket.org/galaxy/galaxy-dist
destination directory: galaxy-dist
adding changesets
adding manifests
adding file changes
█
```

Perform the Mercurial hg clone operation.
This gets a specific galaxy release.

Galaxy upgrade (3)

```
Terminal - gcc2013@gcc-workshop: /home/galaxy_upgrade_howto/galaxy-dist
File Edit View Terminal Tabs Help
gcc2013@gcc-workshop:~$ cd /home/galaxy_upgrade_howto/
gcc2013@gcc-workshop:/home/galaxy_upgrade_howto$ cd galaxy-dist/
gcc2013@gcc-workshop:/home/galaxy_upgrade_howto/galaxy-dist$ hg incoming
real URL is https://bitbucket.org/galaxy/galaxy-dist
comparing with http://bitbucket.org/galaxy/galaxy-dist
searching for changes
█
```

Search for changes in the Mercurial Galaxy repository.

Galaxy Community Conference 2013 - Oslo, Norway

Galaxy upgrade (4)

```
Terminal - gcc2013@gcc-workshop: /home/galaxy_upgrade_howto/galaxy-dist
File Edit View Terminal Tabs Help
ry/session corruption.

changeset: 10002:9d42f1e32efb
branch:    stable
parent:    9996:e79a60e7c67a
user:     Dannon Baker <dannonbaker@me.com>
date:     Wed Jun 12 10:39:09 2013 -0400
summary:   For user impersonation, fully log the admin out prior to assuming user persona to avoid any histo
ry/session corruption.

changeset: 10003:b4a373d86c51
tag:      tip
parent:    10001:471484ff8be6
user:     greg
date:     Wed Jun 12 11:48:09 2013 -0400
summary:   Add targets to Repository Actions menu items.

gcc2013@gcc-workshop:/home/galaxy_upgrade_howto/galaxy-dist$ hg pull
real URL is https://bitbucket.org/galaxy/galaxy-dist
pulling from http://bitbucket.org/galaxy/galaxy-dist
searching for changes
adding changesets
adding manifests
adding file changes
added 1478 changesets with 3964 changes to 1264 files (+1 heads)
(run 'hg heads' to see heads)
gcc2013@gcc-workshop:/home/galaxy_upgrade_howto/galaxy-dist$ hg update release_2013.06.03
1179 files updated, 0 files merged, 452 files removed, 0 files unresolved
gcc2013@gcc-workshop:/home/galaxy_upgrade_howto/galaxy-dist$
```

When you 'pull', Mercurial will fetch all the latest changes since your last 'hg clone' operation.

Galaxy upgrade (5)

```
Terminal - gcc2013@gcc-workshop: /home/galaxy_upgrade_howto/galaxy-dist
File Edit View Terminal Tabs Help
migrate.versioning.script.base DEBUG 2013-06-27 11:03:30,172 Loading script lib/galaxy/model/migrate/versions/0114_update_migrate_tools_table_again.py...
migrate.versioning.script.base DEBUG 2013-06-27 11:03:30,172 Script lib/galaxy/model/migrate/versions/0114_update_migrate_tools_table_again.py loaded successfully
migrate.versioning.script.base DEBUG 2013-06-27 11:03:30,172 Loading script lib/galaxy/model/migrate/versions/0115_longer_user_password_field.py...
migrate.versioning.script.base DEBUG 2013-06-27 11:03:30,173 Script lib/galaxy/model/migrate/versions/0115_longer_user_password_field.py loaded successfully
migrate.versioning.repository DEBUG 2013-06-27 11:03:30,173 Repository lib/galaxy/model/migrate loaded successfully
migrate.versioning.repository DEBUG 2013-06-27 11:03:30,173 Config: OrderedDict([('db_settings', OrderedDict([('__name__', 'db_settings'), ('repository_id', 'Galaxy'), ('version_table', 'migrate_version'), ('required_dbs', '[]')]))])
galaxy.model.migrate.check DEBUG 2013-06-27 11:03:30,177 psycopg2 egg successfully loaded for postgres dialect /home/galaxy_upgrade_howto/galaxy-dist/eggs/SQLAlchemy-0.7.9-py2.7-linux-i686-ucs4.egg/sqlalchemy/engine/url.py:105: SADeprecationWarning: The SQLAlchemy PostgreSQL dialect has been renamed from 'postgres' to 'postgresql'. The new URL format is postgresql[+driver]://<user>:<pass>@<host>/<dbname>
Traceback (most recent call last):
  File "/home/galaxy_upgrade_howto/galaxy-dist/lib/galaxy/webapps/galaxy/buildapp.py", line 35, in app_factory
    app = UniverseApplication( global_conf = global_conf, **kwargs )
  File "/home/galaxy_upgrade_howto/galaxy-dist/lib/galaxy/app.py", line 52, in __init__
    create_or_verify_database( db_url, kwargs.get( 'global_conf', {} ).get( '__file__', None ), self.config.database_engine_options, app=self )
  File "/home/galaxy_upgrade_howto/galaxy-dist/lib/galaxy/model/migrate/check.py", line 107, in create_or_verify_database
    % ( db_schema.version, migrate_repository.versions.latest, config_arg ) )
Exception: Your database has version '109' but this code expects version '115'. Please backup your database and then migrate the schema by running 'sh manage_db.sh upgrade'.
gcc2013@gcc-workshop:/home/galaxy_upgrade_howto/galaxy-dist$
```

After the 'hg pull', when restarting Galaxy and Postgres, you will see this problem. So, you will need to run:

sh manage_db.sh upgrade

Galaxy upgrade (6)

```
Terminal - gcc2013@gcc-workshop: /home/galaxy/galaxy-dist
File Edit View Terminal Tabs Help
gcc2013@gcc-workshop:~$ cd /home/galaxy/galaxy-dist/
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist$ ./manage_db.sh upgrade
/home/galaxy_upgrade_howto/galaxy-dist/eggs/SQLAlchemy-0.7.9-py2.7-linux-i686-uc
s4.egg/sqlalchemy/engine/url.py:105: SADeprecationWarning: The SQLAlchemy Postgr
eSQL dialect has been renamed from 'postgres' to 'postgresql'. The new URL forma
t is postgresql[+driver]://<user>:<pass>@<host>/<dbname>
109 -> 110...

Add UUID column to dataset table

█
```

Running the `manage_db.sh` script updates the Galaxy Postgres SQL schema

Galaxy upgrade (7)

```
Terminal - gcc2013@gcc-workshop: /home/galaxy/galaxy-dist
File Edit View Terminal Tabs Help
0112_add_data_manager_history_association_and_data_manager_job_association_tables DEBUG 2013-06-27 15:35:00,089 Created data_manager_history_association table
Created data_manager_history_association table
0112_add_data_manager_history_association_and_data_manager_job_association_tables DEBUG 2013-06-27 15:35:01,118 Created data_manager_job_association table
0112_add_data_manager_history_association_and_data_manager_job_association_tables DEBUG 2013-06-27 15:35:01,118 Created data_manager_job_association table
Created data_manager_job_association table
done
112 -> 113...

Migration script to update the migrate_tools.repository_path column to point to the new location lib/tool_shed/galaxy_install/migrate.

done
113 -> 114...

Migration script to update the migrate_tools.repository_path column to point to the new location lib/tool_shed/galaxy_install/migrate.

done
114 -> 115...
done
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist$ ./run.sh --reload
```

After the Postgres SQL schema update,
restart Galaxy.

Galaxy upgrade (7)

```
Terminal - gcc2013@gcc-workshop: /home/galaxy/galaxy-dist
File Edit View Terminal Tabs Help
gcc2013@gcc-workshop:~$ cd /home/galaxy/galaxy-dist/
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist$ ./run.sh --daemon
Entering daemon mode
gcc2013@gcc-workshop:/home/galaxy/galaxy-dist$ tail -f paster.log
galaxy.web.framework.base DEBUG 2013-06-27 15:43:37,613 Enabling 'request_types'
API controller, class: RequestTypeAPIController
galaxy.webapps.galaxy.buildapp DEBUG 2013-06-27 15:43:37,613 app.config.api_fold
ers: False
galaxy.webapps.galaxy.buildapp DEBUG 2013-06-27 15:43:37,830 Enabling 'httpexcep
tions' middleware
galaxy.webapps.galaxy.buildapp DEBUG 2013-06-27 15:43:37,831 Enabling 'recursive
' middleware
galaxy.webapps.galaxy.buildapp DEBUG 2013-06-27 15:43:37,861 Enabling 'eval exce
ptions' middleware
galaxy.webapps.galaxy.buildapp DEBUG 2013-06-27 15:43:37,861 Enabling 'trans log
ger' middleware
galaxy.webapps.galaxy.buildapp DEBUG 2013-06-27 15:43:37,861 Enabling 'x-forward
ed-host' middleware
galaxy.webapps.galaxy.buildapp DEBUG 2013-06-27 15:43:37,862 Enabling 'Request I
D' middleware
Starting server in PID 4088.
serving on http://127.0.0.1:8080
```

The `paster.log` file is your troubleshooting friend.

Securing your Galaxy server

- Keep up with your Linux distro updates
- Keep up with the Galaxy updates (hg pull)
- VPN the Galaxy environment



Questions:

georgios@usit.uio.no

katerina.michalickova@usit.uio.no

n.a.vazov@usit.uio.no