

# Installing and Maintaining a Local Galaxy Server – Training Day O

#### 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 (from Galaxy toolshed and your own one)
- NV: Updating the Galaxy installation
- GM: A few closing words on securing your Galaxy installation

#### VM installation check

0 0	Oracle VM VirtualBox Manager	
ew Settings Show	Discard	Details Snapshots
GCC 2013 Wo	📃 General	Preview
🔄 🤣 Running	Name: GCC 2013 Workshop Operating System: Ubuntu	
	System	
	Base Memory: 1024 MB Processors: 2 Boot Order: Hard Disk Acceleration: VT-x/AMD-V, Nested Paging, PAE/NX	
	Display	
	Video Memory: 12 MB Remote Desktop Server: Disabled	
	Storage	
	Controller: SATA SATA Port 0: BasicWorkshop-disk1.vmdk (Nor	mal, 10.00 GB)
	🖗 Audio	
	Host Driver: CoreAudio Controller: ICH AC97	
	P Network	
	Adapter 1: Intel PRO/1000 MT Desktop (Bridged A	dapter, en1: Wi-Fi (AirPort))
	Ø USB	)
	Device Filters: 0 (0 active)	1

VM image download: tp://ftp.no.embnet.org/galaxy/images/ asicWorkshop.ova

> Username: gcc2013 Password: 12345

Hands up if you have <u>not</u>: -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/

# <u>Wi-Fi at UiO:</u> SSID: conferences Password: uio202aar



#### The Galaxy system environment (HPC)



## 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?

#### -Experties, 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 (1)

-	Terminal - gcc2013@gcc-workshop: ~	- + ×
File	e Edit View Terminal Tabs Help	
pure refo tryt zabt gcc2 gcc2 gcc2 gcc2	<pre>e-ftpd-postgresql - Secure and efficient FTP server with PostgreSQL user authe db-server - Reference database and bibliography tool - sql server ton-server - Tryton Application Platform (Server) ftpd-back-pgsql - modular, small and efficient ftp server - PostgreSQL backend bix-server-pgsql - network monitoring solution - server (using PostgreSQL) 2013@gcc-workshop:~\$ 2013@gcc-workshop:~\$ 2013@gcc-workshop:~\$ 2013@gcc-workshop:~\$</pre>	ntication
gcc2 gcc2 gcc2 gcc2	2013@gcc-workshop:~\$ 2013@gcc-workshop:~\$ 2013@gcc-workshop:~\$ 2013@gcc-workshop:~\$	
gcc2 gcc2 gcc2 gcc2 gcc2	2013@gcc-workshop:~\$ 2013@gcc-workshop:~\$ 2013@gcc-workshop:~\$ 2013@gcc-workshop:~\$	
gcc2 gcc2 gcc2 gcc2	2013@gcc-workshop:~\$ 2013@gcc-workshop:~\$ 2013@gcc-workshop:~\$ 2013@gcc-workshop:~\$	
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gcc2 gcc2 gcc2 gcc2	2013@gcc-workshop:~\$ 2013@gcc-workshop:~\$ 2013@gcc-workshop:~\$ 2013@gcc-workshop:~\$	
gcc2	2013@gcc-workshop:~\$ sudo apt-get install postgresql-server-dev-9.1	

#### Install the postgreSQL server from the package manager

# Postgres Configuration (2)

- + × Terminal - gcc2013@gcc-workshop: ~ Edit View Terminal Tabs Help File gcc2013@gcc-workshop:~\$ sudo apt-cache search postgresql | grep client libpq5 - PostgreSQL C client library postgresgl-client - front-end programs for PostgreSQL (supported version) postgresgl-**client**-9.1 - front-end programs for PostgreSQL 9.1 postgresgl-client-common - manager for multiple PostgreSQL client versions guile-pg - Guile bindings for the PostgreSOL client library libghc-postgresgl-simple-dev - mid-level PostgreSQL **client** library libghc-postgresgl-simple-doc - mid-level PostgreSQL client library; documentation libghc-postgresgl-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 libsphinx**client**-0.0.1 - Fast standalone full-text SQL search engine - Client library libsphinx**client**-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-postgresgl - pgsgl driver, cluster management tools, and client tools root-plugin-sql-pgsql - 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 postgreSQL client from the package manager

Galaxy Community Conference 2013 - Oslo, Norway

#### Is the postgreSQL server running?

							Termin	ial - gco	:2013@gcc-	worksh	op: ~		-	+ ×
File	Edit	View	Termi	nal T	abs Hel	р								
gcc20	)13@g	cc-wor	kshop	:~\$										
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gcc20	)13@go	cc-wor	kshop	:~\$										
gcc20	)13@go	cc-wor	kshop	:~\$										
gcc20	)13@g	cc-wor	kshop	:~\$										
gcc20	)13@g	cc-wor	kshop	:~\$										
gcc20	)13@go	cc-wor	kshop	:~\$										
gcc20	)13@go	cc-wor	kshop	:~\$ p	s aux	grep	postgres							
postg	ires	1014	0.1	0.7	52228	7940	?	S	09:47	0:01	/usr/lib/	postgresql/9.1/bin/ <mark>postgres</mark> -D /	var/	/lib
/post	gres	q1/9.1	./main	-c c	onfig_f	ile=/e	etc/postg	resql	/9.1/mai	n/post	tgresql.co	nf		
postg	jres	1574	0.0	0.1	52228	1572	?	Ss	09:47	0:00	postgres:	writer process		
postg	ires	1575	0.0	0.1	52228	1332	?	Ss	09:47	0:00	postgres:	wal writer process		
							-	-						
postg	ires	1576	0.0	0.2	52660	2436	?	Ss	09:47	0:00	postgres:	autovacuum launcher process		
posto	ires	1577	0.0	0.1	22428	1400	?	Ss	09:47	0:00	postares:	stats collector process		
gcc20	13	1982	0.0	0.0	5908	864	pts/0	S+	10:00	0:00	grepco	lor=auto <mark>postgres</mark>		
gcc20	13@g	cc-wor	kshop	:~\$										

## Postgres Configuration (4)

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gcc2	913@g	cc-wor	kshop	:~\$									
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gcc2	913@g	cc-wor	kshop	:~\$_	ps aux	grep	postgres	_					
post	gres	1014	0.1	0.7	52228	7940	?	S	09:47	0:01	/usr/lib/	postgresql/9.1/bin/postgres -[	0 /var/lib
/pos	tgres	q1/9.1	/main	-C (	config_	file=/0	etc/postg	resql	/9.1/mai	n/pos	tgresq1.co	n† 	
post	gres	1574	0.0	0.1	52228	15/2	?	SS	09:47	0:00	postgres:	writer process	
nost	irae	1575	00	ດ 1	52228	1222	2	Se	00.17	6.00	nostaros	wal writer process	
post	Jies	1010	0.0	0.1	52220	1002	r	33	05.47	0.00	postgres.	war writer process	
post	ires	1576	0.0	0.2	52660	2436	?	Ss	09:47	0:00	postares:	autovacuum launcher process	
	J										<b>.</b>	F	
post	gres	1577	0.0	0.1	22428	1400	?	Ss	09:47	0:00	postgres:	stats collector process	
	-												
gcc2	913	1982	0.0	0.0	5908	864	pts/0	S+	10:00	0:00	grepco	lor=auto <mark>postgres</mark>	
gcc2	913@g	cc-wor	kshop:	:~\$									
gcc2	913@g	cc-wor	kshop	:~\$									
gcc2	913@g	cc-wor	kshop	:~\$									
gcc2	913@g	cc-wor	kshop	:~\$									
gcc2	913@g	cc-wor	kshop	:~\$	sudo /e	tc/ini	t.d/postg	resql	stop				
* S	toppi	ng Pos	tgreS(	JF 8	.1 data	ibase s	erver					т	[ OK ]
gcc2	913@g	cc-wor	kshop	:~\$	sudo /e	tc/ini	t.d/postg	resql	start			L	
* S	tarti	ng Pos	tgreS(	ΣΓ_8	.1 data	ibase s	erver						[ OK ]
gcc2	913@g	cc-wor	kshop:	:~\$	sudo /e	tc/ini	t.d/postg	resql	status				
9.1/	nain	(port	5432)	: on	line								
gcc2	913@g	cc-wor	kshop:	:~\$									

How do I stop and start the postgreSQL server?

# Postgres Configuration (5)



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

### Postgres Configuration (6)

-			Tern	ninal - gcc2013@gcc-workshop: ~	- + ×
File	Edit View	Terminal	Tabs	Help	
gcc20 [sudo posto psql Type	013@gcc-wo o] passwor gres@gcc-w (9.1.9) "help" fo	rkshop:~\$ d for gcc orkshop:~ r help.	sudo 2013: \$ psq]	su - postgres L template1	
temp1 ERROF temp1 ERROF temp1 GRAN1 temp1 posto [sudo Sorry [sudo]	Late1=# CRI R: role "( Late1=# CRI R: databas Late1=# CRI Late1=# GRI Late1=# \q gres@gcc-wo D] password (, try aga D] password (, try aga (, tr	EATE USER gcc2013" EATE DATA se "galax ANT ALL P orkshop:~ d for pos in. d for pos in. d for pos in. d for pos in. ect passw t in the orkshop:~ rkshop:~ srkshop:~ \$	gcc20 alread BASE g y" alm RIVILE \$ sudd tgres: tgres: tgres: tgres: sudoen \$ exit sudoen \$ exit	ol3 WITH PASSWORD '12345'; dy exists galaxy; ready exists EGES ON DATABASE galaxy TO gcc2013; o su - gcc2013 ttempts rs file. This incident will be reported. I su - gcc2013 -d galaxy -U gcc2013	

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 webservers 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 lib**apache2**-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 lib<mark>apache2</mark>-mod-perl2-dev - Integration of perl with the Apache2 web server - developme nt files lib**apache2**-mod-perl2-doc - Integration of perl with the Apache2 web server - documenta tion lib**apache2**-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 trough 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	
<pre>libapache2-webkdc - Apache 2 modules for a WebAuth authentication KDC mahara-apache2 - Electronic portfolio, weblog, and resume builder - apache2 ion</pre>	configurat
rt4- <mark>apache2</mark> - Apache 2 specific files for request-tracker4 I terrus <b>apache3</b> . Universal front and for Pound Pohin Databases (for apache 2	) v) (dopro
cated)	x) (depre
gcc2013@gcc-workshop:~\$ gcc2013@gcc-workshop:~\$ sudo apt-get install apache2	

#### Install the Apache web server

# Apache Proxy config (3)

2-	Termin	al - root@gcc-workshop: -		
File Edit View	Terminal Tabs He	lp		
root@gcc-works	shop:~# service ng	inx status		
* nginx is ru	inning			
root@gcc-works	shop:~# service ng	inx stop		
* Stopping no	jinx nginx			[ OK ]
root@gcc-works	shop:~# apt-get			
autoclean	check	dselect-upgrade	source	
autoremove	clean	install	update	
build-dep	dist-upgrade	purge	upgrade	
changelog	download	remove		
root@gcc-works	shop:~# apt-get rem	nove nginx		
Reading packaq	je lists Done			
Building deper	idency tree			
Reading state	information Dor	1e		
The following nginx-commor	packages were auto n nginx-full	omatically installe	d and are no longe	r required:
Use 'apt-get a	autoremove' to remo	ove them.		
The following nginx	packages will be F	REMOVED:		
0 upgraded, 0	newly installed, i	1 to remove and 1 n	ot upgraded.	
After this ope	eration, 91,1 kB di	isk space will be f	reed.	
Do you want to	continue [Y/n]?	(		
(Reading datab	base 201572 fil	les and directories	currently install	ed.)
Removing ngin>	· · · ·			
root@gcc-works	shop:~#			

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 lo	oaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module authn_file_module is already lo	oaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module authz_default_module is alread	y loaded, skipp
ing	
[Wed Jun 26 15:45:11 2013] [warn] module authz_groupfile_module is alrea	ady loaded, ski
pping	
[Wed Jun 26 15:45:11 2013] [warn] module authz_host_module is already le	oaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module authz_user_module is already lo	oaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module autoindex_module is already lo	aded, 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 load	ed, 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, skippin
g	
[Wed Jun 26 15:45:11 2013] [warn] module reqtimeout_module is already lo	oaded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module setenvif_module is already load	ded, skipping
[Wed Jun 26 15:45:11 2013] [warn] module status_module is already loaded	d, skipping
[Wed Jun 26 15:45:11 2013] [warn] The Alias directive in /etc/apache2/m	ods-available/a
lias.conf at line 15 will probably never match because it overlaps an e	arlier Alias.
apache2: Could not reliably determine the server's fully qualified doma:	in name, using
127.0.1.1 TOR ServerName	
nttpd (pid 1849) already running	F 0// 3
	[ ОК ]

gcc2013@gcc-workshop:~\$

#### Start the apache2 service and ignore the warnings.

# Apache Proxy config (5)

-					Termina	al - gcc2013@gcc-workshop: ~ – +	×
File	Edit	Vie	w Termir	nal Tab	s Help		
[Wed	Jun	26 1	5:45:11	2013]	[warn]	module alias_module is already loaded, skipping	
[Wed	Jun	26 1	5:45:11	2013]	[warn]	module auth_basic_module is already loaded, skipping	
[Wed	Jun	26 1	5:45:11	2013]	[warn]	<pre>module authn_file_module is already loaded, skipping</pre>	
[Wed	Jun	26 1	5:45:11	2013]	[warn]	<pre>module authz_default_module is already loaded, skipp</pre>	
ing							
[Wed	Jun	26 1	5:45:11	2013]	[warn]	<pre>module authz_groupfile_module is already loaded, ski</pre>	
ppin	]		_				
[Wed	Jun	26 1	5:45:11	2013]	[warn]	<pre>module authz_host_module is already loaded, skipping</pre>	
[Wed	Jun	26 1	5:45:11	2013]	[warn]	<pre>module authz_user_module is already loaded, skipping</pre>	
[Wed	Jun	26 1	5:45:11	2013]	[warn]	module autoindex_module is already loaded, skipping	
[wed	Jun	26 1	5:45:11	2013]	[warn]	module cgid_module is already loaded, skipping	
[wed	Jun	26 1	5:45:11	2013]	[warn]	module deflate_module is already loaded, skipping	
Lwea	Jun	26 1	5:45:11	2013]	[warn]	module dir_module is already loaded, skipping	
Lwed	Jun	26 1	5:45:11	2013]	[warn]	module env_module is already loaded, skipping	
Lmed	Jun	20 1	5:45:11	2013]	[warn]	module mime_module is already loaded, skipping	
Lmea	Jun	20 1	.5:45:11	2013]	[warn]	module negociacion_module is already loaded, skippin	
y [Wod	lun	26 1	5.15.11	20121	[warn]	module reatimeout module is already loaded skipping	
[Weu	Jun	20 1	5.45.11	2013]	[warn]	module requimeout_module is already loaded, skipping	
[Wed	Jun	26 1	5.45.11	2013]	[warn]	module secenvir_module is already loaded, skipping	
[Wed	Jun	26 1	5.45.11	2013]	[warn]	The Alias directive in /etc/anache2/mods_available/a	
lias	cont	_o F_at	line 15	will_r	robably	v never match because it overlaps an earlier Alias	
apach	1e2:	Coul	d not re	eliably	deter	mine the server's fully qualified domain name, using	
127.0	0.1.1	for	Server	Vame	actori	mile the berver b raily qualified domain name, using	
http	l (n	id 18	49) alre	eady ru	Inning		
p.	(P-		,	,	9	[ OK ]	
gcc20	91300	JCC-W	orkshop	:~\$ apa	che2 -\	V   grep conf	
-D \$	SERVE	ER_CO	NFIG_FI	LE="apa	iche2.co	onf"	
gcc20	013@0	JCC-M	orkshop	:~\$ sud	lo emacs	s /etc/apache2/apache2.conf	U

We shall need to edit the main apache2 config file.

## Apache Proxy config (6)



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

### Apache Proxy config (7)

*	emacs@gcc-workshop - + ×
Fi	le Edit Options Buffers Tools Conf Help
111	📮 🚔 📷 🗶 💆 🛸 👹 🔄 🖆 🔍 😫 💷 📀
	<pre># 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 #</virtualhost></pre>
	<pre># LogLevel: Control the number of messages logged to the error_log. # Possible values include: debug, info, notice, warn, error, crit, # alert, emerg. # LogLevel warn</pre>
	<pre># Include module configuration: Include mods-enabled/*.load Include mods-enabled/*.conf</pre>
	<pre># 2013 Include mods-available/*.load Include mods-available/*.conf</pre>
0	<pre># Include list of ports to listen on and which to use for name based vhosts Include ports.conf</pre>
	#
	<pre># # The following directives define some format nicknames for use with # a CustomLog directive (see below).</pre>
	:%%- apache2.conf 86% L244 (Conf[Space])

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

# Galaxy config (1)

-				Termina	l - gcc201	@gcc-worksho	p: ~/Documents	/Galaxy		- + :	×
File	Edit	View	Termin	nal Tab	s Help						
pping	J										
[Wed	Jun	26 15	:45:11	2013]	[warn]	module auth	nz_host_modu	le is already l	oaded,	skipping	
[Wed	Jun	26 15	:45:11	2013]	[warn]	module auth	nz_user_modu	le is already l	oaded,	skipping	
[Wed	Jun	26 15	:45:11	2013]	[warn]	module auto	pindex_modul	e is already lo	aded, s	skipping	
[Wed	Jun	26 15	:45:11	2013]	[warn]	module cgio	d_module is	already loaded,	skippi	ing	
[Wed	Jun	26 15	:45:11	2013]	[warn]	module defi	Late_module	is already load	led, ski	ipping	
[Wed	Jun	26 15	:45:11	2013]	[warn]	module dir	_module is a	lready loaded,	skippir	ng	
[Wed	Jun	26 15	:45:11	2013]	[warn]	module env	_module is a	lready loaded,	skippir	ng	
Lwed	Jun	26 15	:45:11	2013]	[warn]	module mime	e_module is	already loaded,	SK1pp1	Lng	
Lwea	Jun	26 15	:45:11	2013]	[warn]	module nego	otiation_mod	ule is already	loaded,	skippin	
g Ewlard	lun	26 15	.15.11	20121	[warn]	modulo rog	timeout modu	lo is already l	oodod	skinning	
LMed	Jun	20 10	· 45.11	2013]	[warn]	module set	nvif module	ie is alleady loa	udad el	skipping vinning	
[Wed]	Jun	26 15	:45:11	2013]	[warn]	module seco	us module i	s already loade	nd skir	ning	
[Wed]	Jun	26 15	:45:11	2013]	[warn]	The Alias (	directive in	/etc/apache2/m	iods-ava	ilable/a	
lias.	conf	fat 1	ine 15	will	probably	never mate	ch because i	t overlaps an e	arlier	Alias.	
apach	ne2:	Could	not re	eliably	v deter	ine the se	rver's fully	qualified doma	in name	e, using	
127.0	0.1.1	l for	ServerN	lame .	,		,				
httpo	i (pi	d 184	9) alre	eady ru	unning						
										[ OK ]	
gcc20	) <b>13</b> @g	jcc-wo	rkshop	:~\$ apa	ache2 -\	grep co	וז				
-D 8	SERVE	R_CON	FIG_FI	_E="apa	ache2.co	nf"					
gcc20	013@0	jcc-wo	rkshop	:~\$ cd	/home/	cc2013/Docu	uments/				
gcc20	013@0	JCC-MO	rkshop	~/Docu	uments\$	ls					
Galax	(y										
gcc20	01300	JCC-MO	rkshop	~/Doci	uments\$	cd Galaxy/					
gcc20	J13@Q	JCC-WO	rkshop	~/Doci	uments/(	alaxy\$ is		T			
galax	(y-a) 1200		rkshop		monte //	alaxws sude	mkdir (bom				

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

# Galaxy config (2)

<b>-</b>	Terminal - gcc2013@gcc-workshop: /home							
File	Edit	View	Terminal	Tabs	Help			
galax gcc20 gcc20 total 4 drw gcc20 gcc20	( <b>y-di</b> )13@go )13@go )13@go )xr-xi )xr-xi )13@go	st cc-wor cc-wor r-x 8 r-x 29 cc-wor cc-wor	kshop:~/ kshop:/h gcc2013 gcc2013 kshop:/h kshop:/h	Docume ome\$ gcc20 gcc20 ome\$ ome\$	ents/Galaxy\$ cd /home/ ls -ls 013 4096 juni 26 10:31 galaxy 013 4096 juni 26 14:43 gcc2013 chown -R gcc2013:gcc2013 galaxy/ 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 <mark>galaxy-dist</mark>			
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)



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)



universe\_wsgi.ini: The database\_connection line must be consistent to your Postgres config (slide 14)

# Galaxy config (6)

Ŧ				Term	ninal - gcc2013@gcc-workshop: /home/galaxy/galaxy-dist				
File	Edit	View	Terminal	Tabs	Help				
gcc2( acc2(	cc2013@gcc-workshop:/home/galaxy/galaxy-dist\$ cc2013@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.

**<u>Group</u>**: 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			Analyze Data	Workflow S	hared Data 👻 Visualization 👻	Admin Help+ U	ser •		
ministration	-							10	5007£7,2022
curity	0	manuel.razo.m@gmail.com			manuel-razo	0	1	no	Jan 26, 2012
Manage groups	_	mie231ds@gmail.com			ylwod37ho	0	1	no	Nov 02, 2012
Manage roles		niceg.t.s.118@gmail.com   -			cabnuandell	0	1	no	Nov 06, 2012
ta	0	osalazar@lcg.unam.mx   •			osalazar	0	1	no	Jan 26, 2012
<u>Manage quotas</u> Manage data librarias	0	ozono32@hotmail.com   +			ozono32	0	1	no	Jan 26, 2012
Manage local data (beta)	0	quarkie68@yahoo.co.uk   -			gharisson	0	1	no	Oct 26, 2012
r <b>ver</b> View data types registry	0	rcappello@ecologia.unam.mx   -			rcappello	0	1	no	Jan 27, 2012
View data tables registry	0	regina_gama@hotmail.com			reginahgama	0	1	no	Jan 27, 2012
<u>View tool lineage</u> Reload a tool's configuration	0	roman.zapien@hotmail.com   🕶			romanzapien	0	1	no	Jan 27, 2012
Profile memory usage		samendojohnss@aol.com   -			guaapalod	0	1	no	Oct 28, 2012
Manage jobs		scenesfromamemory4@gmail.com 🖛			benjamin-tovar	0	1	no	Jan 26, 2012
Review tool migration stages Reset metadata for tool shed		skladarhm@mail.ru   •			skladarh	0	1	no	Dec 05, 2012
repositories Manage installed tool shed repositories		slvvasquez1@gmail.com   •			silviabio	0	1	no	Feb 01, 2012
ol sheds		s.p.a.r.s.elyqlo.q.x.dw@gmail.com   🕶			chmsnhlb	0	1	no	Mar 22, 2013
Search and browse tool sheds		s.p.a.rs.ely.q.lo.qxd.w@gmail.com   +			briwdbqwy2r	0	1	no	Mar 22, 2013
Manage form definitions		s.p.arse.l.yql.o.q.x.dw@gmail.com   🕶			qzmphxvai	0	1	no	Mar 21, 2013
mple Tracking Manage sequencers and external		s.p.arsel.yql.o.q.x.dw@gmail.com   🕶			rpyxbzb qhlg	0	1	no	Mar 21, 2013
<u>services</u> Manage request types	0	s.pa.r.sel.y.qloq.xdw@gmail.com   🕶			duwhqqbct	0	1	no	Mar 22, 2013
Sequencing requests Find samples		s.par.s.e.l.y.q.lo.q.x.dw@gmail.com   -			kostiqlzavx	0	1	no	Mar 23, 2013
		s.par.s.e.l.y.ql.o.qxdw@gmail.com   +			xfjhglwxdfe	0	1	no	Mar 23, 2013
		toni.hurtado@ncmm.uio.no 💌			tonih	0	1	no	Feb 17, 2012
		trine.rounge@krettregisteret.no   -			trine-b-rounge	0	2	no	Jan 17, 2013
		wong2hikonrii@gmail.com   -			engibbono	0	1	no	Oct 26, 2012
		zameloona1487@gmail.com   •			zame1487	0	1	no	Jan 26, 2012
		For 0 selected items: Reset Password							

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

🖵 Galaxy		Analyze Data	Workflow	Shared Data <del>-</del>	Visualization <del>-</del>	Admi
Administration	🕑 Group Ian Mills Data Group is currently ass	ociated with 1 roles and 3 users				
Security <ul> <li>Manage users</li> <li>Manage groups</li> </ul>	Group 'Ian Mills Data Group'					
<ul> <li>Manage roles</li> </ul>	Roles associated with 'lan Mills Data Group'	Roles not associated with 'lan Mills Data Gro	ıp'			
<ul> <li>Data <ul> <li>Manage quotas</li> <li>Manage data libraries</li> <li>Manage local data (beta)</li> </ul> </li> <li>Server <ul> <li>View data types registry</li> <li>View data tables registry</li> <li>View tool lineage</li> </ul> </li> </ul>	Ian Mills Data Group	Users associated with 'lan Mills Data Group' gmagklaras@gmail.com ian.mills@ncmm.uio.no i.g.mills@ncmm.uio.no	Users not a	associated with 'la	an Mills Data Grou	p'
<ul> <li><u>Profile memory usage</u></li> <li><u>Manage jobs</u></li> </ul>		>>				

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



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

#### **Data Libraries**

search dataset name, info, message, dbkey	

Advanced Search

Data library name	Data library description	Created	Last Updated
Escherichia coli	UNAM Course Talleres 2012	Jan 21, 2012	Jan 21, 2012
Human reads	Human reads FASTQ demo	Jan 21, 2012	Jan 21, 2012
Mills BGI	BGI data for the Mills group	Jan 09, 2013	Jan 09, 2013
Mills Lib1	Lib1 Fast Chip-Seq	Jan 09, 2013	Jan 09, 2013
Reference Genomes		Jan 09, 2013	Jan 09, 2013
C test4		Jan 26, 2012	Jan 26, 2012
trine01	Methylation analysis for Trine Rounge	Jan 14, 2013	Jan 14, 2013
Uniprot Fasta		Oct 25, 2012	Oct 25, 2012
Viral influenza		Jan 22, 2012	Jan 22, 2012
For 0 selected libraries: Delete			

#### Data Library "Escherichia coli"

Containing the E. Coli reference genome			
Name	Message	Data type	Date uploaded
AP012306.fasta -		fasta	2012-01-21
SRR001666_1.fastq -		fastq	2012-01-21
For selected datasets: Import to current history V Go			

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

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

Q

· 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:

test quota 1

#### Description:

Demo GCG 2013

#### Amount

400gb

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

V

#### Assign, increase by amount, or decrease by amount?

= ~

#### Is this quota a default for a class of users (if yes, what type)?

No

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

Users not associated with new quota	
Groups associated with new quota	Groups not associated with new quota
	Ian Mills Data Group
>>	
	Users not associated with new quota

# Installing Galaxy tools i)NCBI BLAST+ ii)write your own tool and install it

#### Installing Galaxy tools (1)

#### Tool installation

#### Command line environment

#### Galaxy xml and tool config

#### Installing Galaxy tools (2)

```
Terminal - gcc2013@gcc-workshop: ~/Downloads/blastfiles
                                                                         + \times
 Ŧ
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... conne
cted.
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)
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

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#### Installing Galaxy tools (3)

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... conne cted. 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) 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... conne cted. 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\$

Fetch the BLAST database and tool tarballs by FTP

#### Installing Galaxy tools (4)

-	Terminal - gcc2013@gcc-workshop: ~/db								
File	Edit	View	Terminal	Tabs	Help				
gcc20	)13@g	cc-wor	kshop:~\$	cd					
gcc20	)13@go	cc-wor	kshop:~\$	mkdir	db				
gcc20	)13@go	c <mark>c-wo</mark> r	kshop:~\$	cd db	)				
gcc20	)13@g	cc-wor	kshop:~/	db\$ m∖	/ ~/Downloads/blastfiles/pataasmall.tar.gz .				
gcc20	)13@g	cc-wor	kshop:~/	db\$ ta	ır xvzf pataasmall.tar.gz				
pataa	ismal.	l.phr							
pataa	ismal.	l.pin			т				
pataa	ismal.	1.psq			1				
gcc20	)13@go	cc-wor	kshop:~/	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 -1 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 too directory entry

#### Installing Galaxy tools (5)

- + × emacs@gcc-workshop  $\nabla$ File Edit Options Buffers Tools Help 🕌 🔄 📋 🔍 😐 💷 📀 <u>-</u> #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/152 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 Overview of Emacs features at gnu.org Emacs Guided Tour -U:%%- \*GNU Emacs\* (Fundamental)-----Top L3

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

#### Installing Galaxy tools (6)

# Navigate to the galaxy-dist/tool-data dir and check out the blastdb\_p.loc file

# Installing Galaxy tools (7)

-	Terminal - gcc2013@gcc-workshop: /home/galaxy/galaxy-dist — + ×
File	Edit View Terminal Tabs Help
gcc20	13@gcc-workshop:/home/galaxy/galaxy-dist/tool-data\$ cd
gcc20	13@gcc-workshop:/home/galaxy/galaxy-dist\$ emacs tool_cont.xml
-1	emacs@gcc-worksnop - + A
File	Edit Options Buffers Tools XML Help
=	, 🖆 🔝 💥 💆 🧐 😽 🍹 🖺 🥄 🔛 🕐
1 <	<pre>?xml version="1.0"?&gt;</pre>
<	toolbox>
	<section id="ncbi_blast_plus_tools" name="NCBI BLAST+"></section>
	<tool file="ncbi_blast_plus/ncbi_blastp_wrapper.xml"></tool>
	<pre><section id="myTools" name="MyTools"></section></pre>
	<pre><tool file="myTools/helloVM.xml"></tool></pre>
	<section id="getext" name="Get Data"></section>
	<tool file="data_source/upload.xml"></tool>
	<tool file="data_source/ucsc_tablebrowser.xml"></tool>
-U:*	<pre>*- tool_conf.xml Top L3 (nXML Valid)</pre>
n w	elcome to <u>GNU Emacs</u> , one component of the <u>GNU/Linux</u> operating system.
R	To be shaded in the state be seen as a second
	Learn basic keystroke commands
0.8	or wond Emacs. Top Lo (Fundamental)
tł	he aalaxy-dist/tool-data dir, you also need
	edit the tool confyml file

#### Installing Galaxy tools (8)

Ŧ				Te	erminal - gcc2013@gcc-workshop: /home/galaxy/galaxy-dist	-	+ :	×
File	Edit	View	Terminal	Tabs	Help			
jcc2( in	)13@go	cc-wor	kshop:/ho	ome/ga	alaxy/galaxy-dist\$ export PATH=\$PATH:/home/gcc2013/src/ncbi-blast-2.2	2.28	}+/b	
Ŧ				Te	erminal - gcc2013@gcc-workshop: /home/galaxy/galaxy-dist	-	+ 3	×
File	Edit	View	Terminal	Tabs	Help			
JCC20	)13@go	c-wor	kshop:/ho	ome/ga	alaxy/galaxy-dist\$ ./run.shreload			

#### 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)

- Galaxy	Analyze Data Workflow Shared Data - Visualization - Help - User -	Using	206 bytes
Tools	Upload File (version 1.1.3)	History	0 0
Search tools	File Format:	Unnamed history 206 bytes	
<ul> <li><u>NCBI BLAST+ blastp</u> Search protein database with protein query sequence(s)</li> </ul>	Which format? See help below File:	2: demo script on infile.txt 1 line format text, database: ?	• 0 %
MyTools	/home/gcc2013/Downloads Browse		0
Get Data     Upload File from your computer	fail. To upload large files, use the URL method (below) or FTP (if enabled by the site administrator).	Hello tutorial participant!	This Galax ▶
<ul> <li>UCSC Main table browser</li> </ul>	URL/Text:		
UCSC Test table browser		1: infile.txt	• / %
BX table browser			
EBI SRA ENA SRA	N		
Get Microbial Data	Here you may specify a list of URLs (one per line) or paste the contents of a file.		
<ul> <li>BioMart Central server</li> </ul>	Convert spaces to tabs:		
BioMart Test server	Yes Use this option if you are entering intervals by hand.		
<u>CBI Rice Mart</u> rice mart	Genome:		
<u>GrameneMart</u> Central server	unspecified (?) *		
<ul> <li>modENCODE fly server</li> </ul>			
<u>Flymine</u> server	Execute		
<			>

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

## Installing Galaxy tools (10)

- Galaxy	Analyze Data Workflow Shared Data - Visualization - Help - U	lser <del>-</del>	Using 287 bytes
Tools	NCBLBLAST+ blasto (version 0.0.10)	6	History C O
search tools	Protein query sequence(s):  4: query.fa		Unnamed history 287 bytes
<ul> <li><u>NCBI BLAST+ blastp</u> Search protein database with protein</li> </ul>	Subject database/sequences:		<u>4: query.fa</u>
query sequence(s)	BLAST Database 💲		2: demo script on infile.txt
MyTools Cot Date	Protein BLAST database:		1 line format: text, database: <u>2</u>
Upload File from your computer	custom pataa db 🛫		
UCSC Main table browser	Type of BLAST:		Hello tutorial participant! This Galax
UCSC Test table browser	<ul> <li>blastp</li> <li>blastp-short</li> </ul>		· •
<ul> <li>UCSC Archaea table browser</li> </ul>	Set expectation value cutoff:		1: infile.txt
<u>BX</u> table browser	0.001	Ľ	
EBI SRA ENA SRA	Output format:		
<u>Get Microbial Data</u>	Tabular (standard 12 columns) 💲		
BioMart Central server	Advanced Options:		
<ul> <li>BioMart Test server</li> </ul>	Hide Advanced Options 💲		
<ul> <li><u>CBI Rice Mart</u> rice mart</li> </ul>			
<ul> <li><u>GrameneMart</u> Central server</li> </ul>	Execute		
<ul> <li>modENCODE fly server</li> </ul>			
Flymine server	Note. Database searches may take a substantial amount of time. For large input datasets it is advisable to allow overnight processing.		
<		-	

#### Now run your BLAST+ query!

## Installing Galaxy tools (11)

- Galaxy	Analyze Data	Workflow	Shared Data <del>-</del>	Visualiz	tation <del>-</del>	Help		User +		Using	433 by	ytes
Tools	unnamed g	i 91146441 gb	ABE22103.1	100.00	80 0	0	1	80	161	History	C	0
search tools										Unnamed history 433 bytes		
<u>NCBI BLAST+ blastp</u> Search protein database with protein										9: blastp on db	•	7 🕱
query sequence(s)										4: query.fa	• 0	1 22
MyTools Get Data Send Data ENCODE Tools										2: demo script on infile.txt 1 line format text, database: <u>2</u>	• 0	7 %
Lift-Over		N									~	
Text Manipulation		42								Hello tutorial participant!	This G	alax
Filter and Sort												
Join, Subtract and Group Convert Formats										1: infile.txt	•	7 %
Extract Features												
Fetch Sequences												
Fetch Alignments												
Get Genomic Scores												
Operate on Genomic Intervals												
Wavelet Analysis												
ζ									•	Ш		>
× Find: ubuntu	∢ <u>P</u> revious	▶ <u>N</u> ext <mark>/</mark> H	ighlight <u>a</u> ll 🗌 I	Mat <u>c</u> h cas	e 🤤	Phrase	e not	found				

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

#### Installing Galaxy tools (12)

Ψ		Terminal -	gcc2013@gcc-	workshop: ~/Down	loads		- + ×
File Edit	View Termir	al Tabs	Help				
gcc2013@gc	c-workshop:	~\$ cd					
gcc2013@gc	c-workshop:	~\$ cd D	ownloads				
gcc2013@gc	c-workshop:	~/Downl	oads\$ wget	ftp://ftp.no	.embnet.org/g	galaxy/tool	files.
tar.gz	00.00.04.5						
2013-00-	28 08:34:50 -> /toolfi	los tar		embnet.org/ga.	Laxy/toolfile	es.tar.gz	
Resolving	ftp.no.embr	net.org	.yz (ftp.no.em)	bnet.ora) 1	129.240.235.1	30	
Connecting	to ftp.no.	embnet.	org (ftp.no	o.embnet.org)	129.240.235.	130 :21	conne
cted.	·		5	37	•	•	
Logging in	as anonymo	ous	Logged in!				
==> SYST .	done.	==> PW	D done				
==> TYPE I	done.	==> CW	/D (1) /gala	axy done.			
=> SIZE C	done	ur.gz > □□	. /5/ TP toolfild	as tar dz	done		
length: 75	7 (unauthor	itative	)	es.tar.yz	uone.		
g	. (		·				
100%[=====	===========		===========	====>] 757	K/	′s in 0s	
2013-06-28	08:34:55 (	1,66 MB	/s) - 'too	lfiles.tar.gz	' saved [757]		
acc2013@ac	c-workshop:	~/Down1	oads\$ tar >	xvzf toolfiles	s.tar.oz		
toolfiles/							
toolfiles/	helloVM.pl						
toolfiles/	tool_conf.>	ml					
toolfiles/	infile.txt					I	
toolfiles/	helloVM.xml	(D7					
gcc2013@gc	c-workshop:	~/Down1	.oads\$				U

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

# Installing Galaxy tools (13)

<pre>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\$ 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\$ chmod a+x helloVM.pl gcc2013@gcc-workshop:/home/galaxy/galaxy-dist/tools/myTools\$ ls -1 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\$ gcc2013@gcc-workshop:/home/galaxy/galaxy-dist/tools/myTools\$ 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 id="myTools" name="MyTools"></section></pre>
<pre>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</pre>

#### Installing Galaxy tools (14)



#### Editing galaxy-dist/tool-data/tool\_conf.xml file.

#### Installing Galaxy tools (15)

- Galaxy	Analyze Data Workflow Shared Data - Visualization - Help - User -	Using 0 bytes
Tools search tools	V Hello world! It's running To customize this page edit static/welcome.html	History 2 0 Unnamed history 0 bytes
demo script for Galaxy tutorial     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	<section-header><section-header><text><text><image/></text></text></section-header></section-header>	Your history is empty. Click 'Get Data' on the left pane to start
Regional Variation Multiple regression Multivariate Analysis Evolution	<u>Galaxy</u> is an open, web-based platform for data intensive biomedical research. The <u>Galaxy team</u> is a part of <u>BX</u> at <u>Penn State</u> , and the <u>Biology</u> and <u>Mathematics and</u> <u>Computer Science</u> departments at <u>Emory University</u> . The <u>Galaxy Project</u> is supported in part by <u>NHGRI</u> , <u>NSF</u> , <u>The Huck Institutes of the Life Sciences</u> , <u>The Institute for</u> <u>CyberScience at Penn State</u> , and <u>Emory University</u> .	

#### Restart Galaxy. Can you spot the new tool on the left?

### Installing Galaxy tools (16)

- Galaxy	Analyze Data Workflow Shared Data - Visualization - Help - User -	Using 21 by	/tes
Tools	demo script (version 1.0.0)	History 2	•
search tools	Source file:	Unnamed history 21 bytes	
demoiscript for Galaxy tutorial	L. HINC.OC +	1: infile.txt 👁 6	7 22
Get Data  Upload File from your computer	Execute		
UCSC Main table browser     UCSC Test table browser	This tool is to illustrate a simple XML tool definition file.		
UCSC Archaea table browser			
<u>BX</u> table browser			
EBI SRA ENA SRA	ß		
<u>Get Microbial Data</u>			
BioMart Central server			
BioMart Test server			
<u>CBI Rice Mart</u> rice mart			
<u>GrameneMart</u> Central server			
<ul> <li>modENCODE fly server</li> </ul>			
<u>Flymine</u> server			
Flymine test server			
modENCODE modMine server			
<			>

#### Upload the infile.txt into your history and Execute.

#### Installing Galaxy tools (17)

- Galaxy	Analyze Data Workflow Shared Data + Visualization + Help + User +	Using 125 bytes	s
Tools	The following job has been successfully added to the queue:	History C 0	ł
search tools	2: demo script on infile.txt	Unnamed history	
<u>demoiscript for Galaxy tutorial</u>	You can check the status of queued jobs and view the resulting data by refreshing the <b>History</b> pane. When the job has been run the status will change from 'running' to 'finished' if completed successfully or 'error' if	2: demo script on infile.txt	3
<u>Upload File</u> from your computer	problems were encountered.	format: text, database: 2	
UCSC Main table browser     UCSC Test table browser		Hello tutorial participant! This Gala	ax
UCSC Archaea table browser     BX table browser		1: infile.txt	2
EBI SRA ENA SRA     Get Microbial Data			
BioMart Central server     BioMart Test server	A		
<u>CBI Rice Mart</u> rice mart			
<u>modENCODE fly</u> server			
Flymine server     Flymine test server			
modENCODE modMine server			
<			>

#### 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)

-			Termin	al - gcci	2013@gcc-worksho	p: /h	ome/galaxy_upgrade_howto	 +	2
File	Edit V	/iew	Terminal	Tabs	Help				
gcc20 /home	)13@gcc /gcc20	:-wor )13	kshop:~\$	pwd	237				
gcc20 [sudo gcc20	)13@gcc )] pass )13@gcc	-wor word	kshop:~\$ for gcc kshop:~\$	sudo 2013: ls -l	mkdir /home/g .s /home/	ala	xy_upgrade_howto		
total	12								
4 drv 4 drv 4 drv gcc20 gcc20	ıxr-xr- ıxr-xr- ıxr-xr- )13@gcc )13@gcc	x 3 x 2 x 29 :-wor :-wor	gcc2013 root gcc2013 kshop:~\$ kshop:~\$	gcc20 root gcc20 sudo cd /h	13 4096 juni 4096 juni 13 4096 juni chown -R gcc2 ome/galaxy_up	27 27 27 013 gra	10:05 galaxy 10:24 galaxy_upgrade_howto 10:03 gcc2013 :gcc2013 /home/galaxy_upgrade_howto/ de_howto/		
gcc20	)13@gcc	-wor	kshop:/h	ome/ga	laxy_upgrade_	how	to\$		

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

Ι

### Galaxy upgrade (2)

Terminal - gcc2013@gcc-workshop: /home/galaxy_upgrade_howto		+	×
File Edit View Terminal Tabs Help			
<pre>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:/home/galaxy_upgrade_howto/ gcc2013@gcc-workshop:/home/galaxy_upgrade_howto gcc2013@gcc-workshop:/home/galaxy_upgrade_howto/ gcc2013@gcc-workshop:/home/galaxy_upgrade_howto/ gcc2013@gcc-workshop:/home/galaxy_upgrade_howto gcc2013@gcc?home/galaxy_gcc2013 gcc2013@gcc?home/galaxy_upgrade_howto gcc2013@gcc?home/galaxy_upgrade_howto gcc2013@gcc</pre>	с <b>у</b> - с	lis	st
adding changesets adding manifests adding file changes			

Perform the Mercurial hg clone operation. This gets <u>a specific galaxy release</u>.

Ι

### 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.

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

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\$

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

gcc2013@gcc-workshop:/home/galaxy\_upgrade\_howto/galaxy-dist\$ hg pull

Dannon Baker <dannonbaker@me.com>

date: Wed Jun 12 10:39:09 2013 -0400 For user impersonation, fully log the admin out prior to assuming user persona to avoid any histo summary: ry/session corruption.

File ry/session corruption.

stable

changeset: branch:

parent:

user:

Edit View Terminal Tabs Help

10002:9d42f1e32efb

9996:e79a60e7c67a

Galaxy upgrade (4)

Terminal - gcc2013@gcc-workshop: /home/galaxy\_upgrade\_howto/galaxy-dist

- + ×

#### Galaxy upgrade (5) $- + \times$ 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\_upd ate\_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\_lon ger\_user\_password\_field.py loaded successfully migrate.versioning.repository DEBUG 2013-06-27 11:03:30,173 Repository lib/galaxy/model/migrate loaded success fully 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.p y:105: SADeprecationWarning: The SQLAlchemy PostgreSQL dialect has been renamed from 'postgres' to 'postgresgl '. The new URL format is postgresgl[+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.da tabase\_engine\_options, app=self ) File "/home/galaxy\_upgrade\_howto/galaxy-dist/lib/galaxy/model/migrate/check.py", line 107, in create\_or\_veri fy\_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 a nd 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)

- X

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

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-

```
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_table
s 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_table
s 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_table
s 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 - + 3
File Edit View Terminal Tabs Help
gcc2013@gcc-workshop:~\$ cd /home/galaxy/galaxy-dist/ gcc2013@gcc-workshop:/home/galaxy/galaxy-dist\$ ./run.shdaemon 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.

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#### 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

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Saturday, June 29, 13