UNIVERSITY OF AMSTERDAM

2017

TUX server manual

VERSIE:1.30

TECHNISCHE ONDERSTEUNING PSYCHOLOGIE

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Contents

The Ubuntu MATE Linux servers

We have several servers to facilitate (MRI) data analysis. These servers have 8-16 processor cores and 64Gb - 128Gb internal system memory. This should be sufficient for most calculations. The Ubuntu MATE Linux operating system is on a separate (RAID1) disk and all data is on a RAID5 or RAID6 disk array. The RAID array gives some redundancy regarding hard disk failure (typically one drive can fail without compromising the array). Despite the redundancy in the hardware there is always the possibility of (file)system corruption and (file)system failure. **There is no backup of the TUX servers, so only temporary[1] files should be stored on the TUX machines. Any data files of any value should be kept on the FMGSTORAGE file server.**

There is no hardcore dedicated Linux system administrator at the technical support Behavioural Science Lab (BSL), so we can only provide “best effort support”.

Server updates

Please keep in mind the Linux server needs updates regularly. A system update and reboot once a month is the absolute minimum. Under normal circumstances the update **starts at the first Wednesday of the month at 16:00**. Any running programs will be ‘killed’ (aborted) at or around 16:00 on the first Wednesday of the month. No warning will be given of a system update / reboot.

Always logout (=terminate/end session) before an update.

Getting an account

Please send an e-mail to: TOP-TUX-beheer-fmg@uva.nl
If you want an account on a dedicated server of your research group, please include the research group stakeholder in the cc (find stakeholders in table below), quoting the name of the machine in question (e.g. “tux14fmg”), your full name, your UvA ID and your e-mail address.

1 For our purposes, ‘temporary’ is anything that you will not need in the near future – i.e. It does not matter to you if it is gone tomorrow, or maybe even after lunch.

Domain name	IP address	Stakeholder	Department
tux05psy.fmg.uva.nl	145.18.151.212	Henk Cremers	KP department
tux06psy.fmg.uva.nl	145.18.151.218	Birte Forstmann	B&C group Birte
tux07psy.fmg.uva.nl	145.18.151.214	Birte Forstmann	B&C group Birte
tux08psy.fmg.uva.nl	145.18.151.216	Steven Scholte	B&C group Steven
tux09psy.fmg.uva.nl	145.18.151.179	Michiel van Elk	SP department
tux10psy.fmg.uva.nl	145.18.151.32	Simon van Gaal	B&C group Simon
tux11psy.fmg.uva.nl	145.18.151.222	Anneke Alkemade	OPS group Birte
tux12psy.fmg.uva.nl	145.18.151.135	Steven Scholte	B&C group Steven
tux13psy.fmg.uva.nl	145.18.151.129	Janna Cousijn	OPS department
tux14psy.fmg.uva.nl	145.18.151.105	Marcus Spaan	OZI/Spinoza/OWI
tux15psy.fmg.uva.nl	145.18.151.107	Heleen Slagter	B&C and group Heleen
tux16psy.fmg.uva.nl	145.18.151.215	Simon van Gaal	B&C group Simon
tux17psy.fmg.uva.nl	145.18.151.220	Renée Visser	KP department
tux18psy.fmg.uva.nl	145.18.151.125	Birte Forstmann	B&C group Birte
tux19psy.fmg.uva.nl	145.18.151.230	Henk Cremers	KP department
tux20psy.fmg.uva.nl	145.18.151.8	Steven Scholte	B&C group Steven
tux21psy.fmg.uva.nl	145.18.151.218	Wouter van den Bos	OPS department
tux22psy.fmg.uva.nl	145.18.151.214	Birte Forstmann	B&C group Birte

Costs

For a dedicated server, you the only the server hardware costs need be met. This is only a fraction (<10%) of the real costs involved over the whole life (> 5 years) of the machine, The research institute (OZI) pays for the infrastructure (server room, cooling system, UPS, server racks) and running costs (energy consumed for the server and cooling, network connection(s) (annual fee for IC) and the personal costs). For a average server you pay something like 12k€. A server should powerful enough to accommodate an MRI research group. If your research group doesn't have access to a dedicated server (PML and A&O), you can get an account can be applied for on the OZI (research institute) TUX14 server.

Software available on the servers

All servers are more or less the same. The default installations have the following programs installed: FSL, FreeSurfer, Matlab, Docker (rootless), R, R-Studio.

For Python (especially if you use it a lot) the recommendation is to install it to your home directory. The same goes for FSL and FreeSurfer if you use another version of the software.

Remote desktop X2Go client software

You'll get an account on one of the following Linux servers:

Domain name	IP address	Stakeholder	Department
tux05psy.fmg.uva.nl	145.18.151.212	Henk Cremers	KP department
tux06psy.fmg.uva.nl	145.18.151.218	Birte Forstmann	B&C group Birte
tux07psy.fmg.uva.nl	145.18.151.214	Birte Forstmann	B&C group Birte
tux08psy.fmg.uva.nl	145.18.151.216	Steven Scholte	B&C group Steven
tux09psy.fmg.uva.nl	145.18.151.179	Michiel van Elk	SP department
tux10psy.fmg.uva.nl	145.18.151.32	Simon van Gaal	B&C group Simon
tux11psy.fmg.uva.nl	145.18.151.222	Anneke Alkemade	OPS group Birte
tux12psy.fmg.uva.nl	145.18.151.135	Steven Scholte	B&C group Steven
tux13psy.fmg.uva.nl	145.18.151.129	Janna Cousijn	OPS department
tux14psy.fmg.uva.nl	145.18.151.105	Marcus Spaan	OZI/Spinoza/OWI
tux15psy.fmg.uva.nl	145.18.151.107	Heleen Slagter	B&C and group Heleen
tux16psy.fmg.uva.nl	145.18.151.215	Simon van Gaal	B&C group Simon
tux17psy.fmg.uva.nl	145.18.151.220	Renée Visser	KP department
tux18psy.fmg.uva.nl	145.18.151.125	Birte Forstmann	B&C group Birte
tux19psy.fmg.uva.nl	145.18.151.230	Henk Cremers	KP department
tux20psy.fmg.uva.nl	145.18.151.8	Steven Scholte	B&C group Steven
tux21psy.fmg.uva.nl	145.18.151.218	Wouter van den Bos	OPS department
tux22psy.fmg.uva.nl	145.18.151.214	Birte Forstmann	B&C group Birte

For the remote desktop we use X2Go. This is a fast terminal server solution. Furthermore you can choose many different (full screen) resolutions on the client side. Clients are available for Windows, Mac and Linux. The remote desktop experience will benefit especially compared to VNC.

X2Go remote desktop is a persistent remote desktop solution. So it is possible to simply suspend the X2Go session. Your session keeps running (to a certain extent) at the server and at a later time you can simply reconnect to this running session (even from a different location if you like). This option is especially important if you have some jobs running. **However if you can (I.e. no running jobs) please logout since this improves the server performance. You'll get a new and "clean" session if you start one again (terminate session -> or log out from the Ubuntu MATE menu bar).**

- Suspending the session will preserve most running applications inside the session and allows you to reconnect to the session at a later time.
- Terminating the session will kill all the running applications inside the session and all unsaved work will be lost.

Install X2Go All WINDOWS versions

X2Go download:
http://wiki.x2go.org/doku.php/download:start
The "mswin" (first download option) works out of the box (install with admin rights).

Install X2Go OSX

X2Go download:

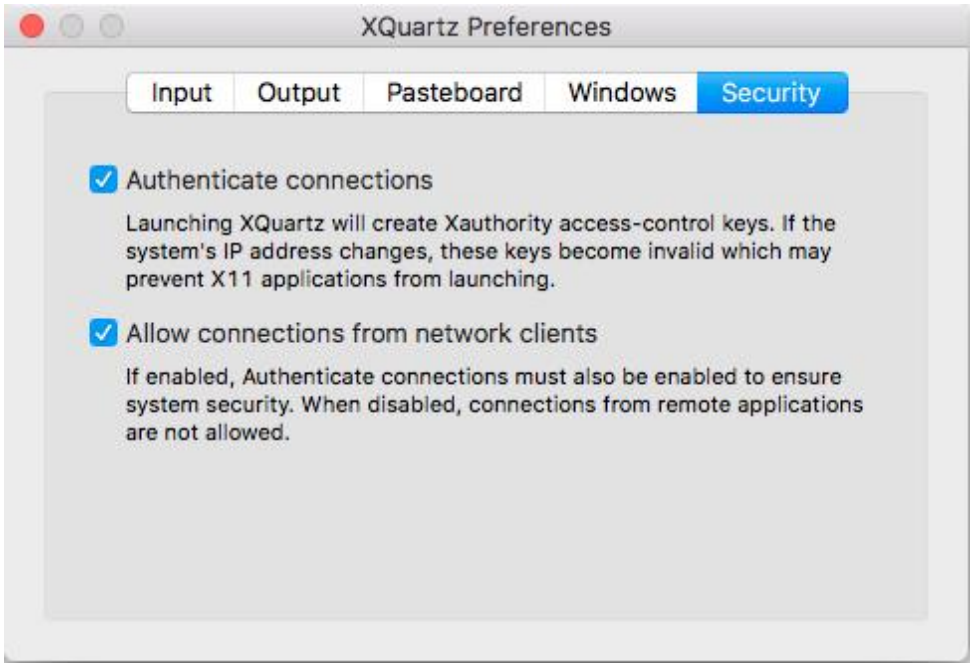
http://wiki.x2go.org/doku.php/download:start

Download the correct DMG depending the OSX version you use.
OS X 10.11 and higher DMG
macOS 10.13 and higher DMG

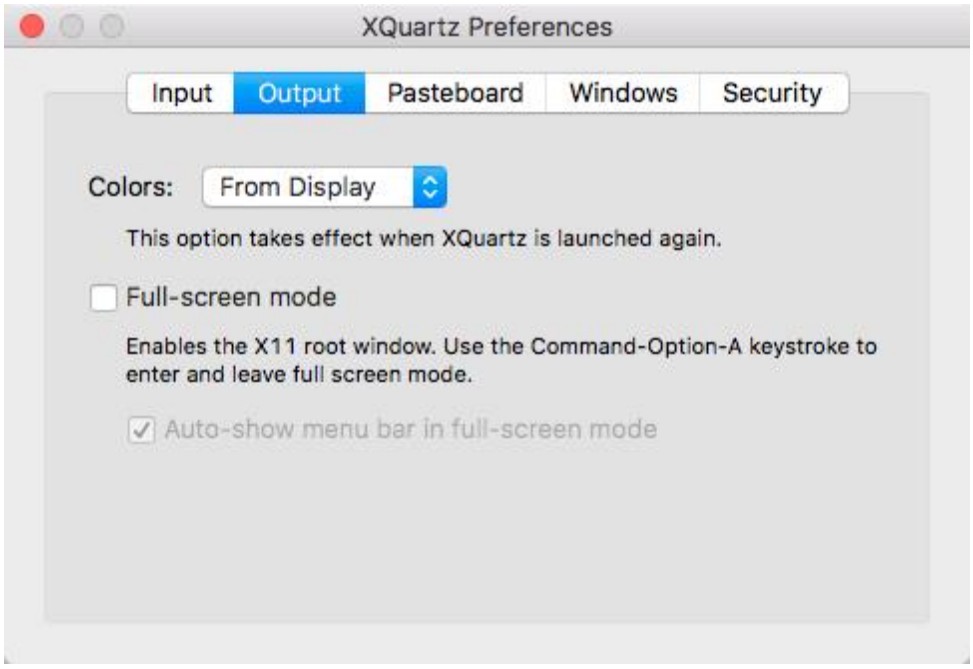
To install the DMG you may need to adjust some security settings. Find more information here:
http://osxdaily.com/2016/09/27/allow-apps-from-anywhere-macos-gatekeeper/

Furthermore you need to install and configure the Xquartz client.

Some OSX XQuartz recommendations:
You may want to adjust these settings to your liking. The options below are just how I like my XQuartz windows to behave:



XQuartz should accept network connections.



I personally don't like XQuartz to go completely full screen. If you prefer the full screen

option please remember you need “Command ⌘+ Option + A” to toggle the full screen option.

Firewall settings Linux servers

From 2017 on, connections to the TUX servers are only possible from within the UvA network. This includes all computers at the UvA site, and therefore includes UvA-VPN users but specificity does not include Eduroam users. For more information about UvA-VPN see: http://student.uva.nl/en/az/content/uvavpn/download/download-uvavpn-software.html.

If your UvA appointment or study ends you can’t connect to the TUX anymore. If you still need access you should apply for a guest account at the secretariat of your department.

If you get a connection error please check: www.whatismyip.com.
IP addresses that have access:
145.18. * . * (= UvA network)
146.50. * . * (= UvA VPN network)
Eduroam has by default **no** access (195.169. * . *)

2FA

By default all accounts require 2FA. It is highly recommended to use a separate device (most probably your phone) for the Google authenticator app. Once you’ve the Google authenticator app installed you need to create an account for the TUX server:

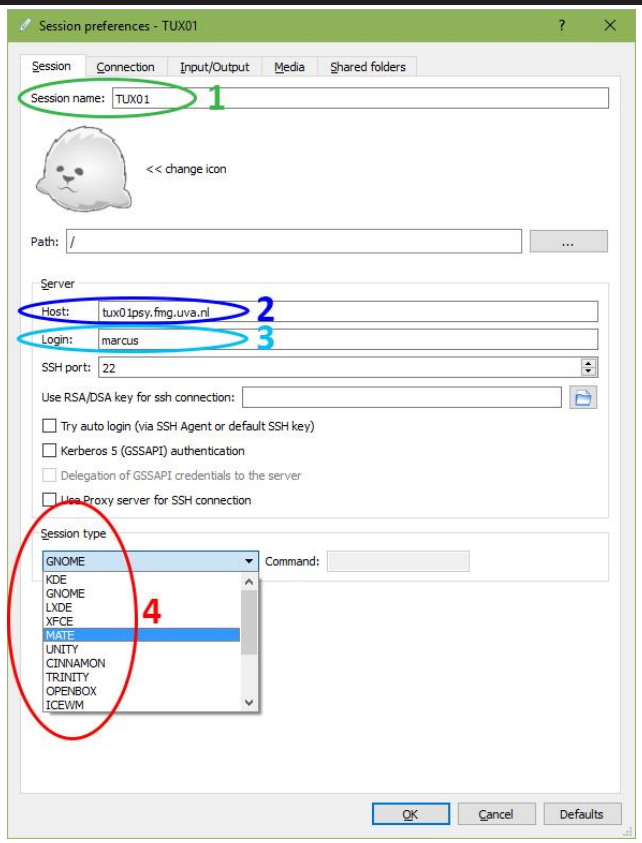
Set up Authenticator:

1. Install the Google authenticator app
2. Open the Google authenticator app
3. Use the “+” sign to add an account
4. Choose “Enter a setup key”
5. Give an account name
6. Paste the secret key you received by SMS (that’s the first long key)
7. Verify the connection is working
8. Delete your SMS with the secret key

Connecting using X2Go (all TUX servers)

Open X2Go and select (upper left) a new session. Now:

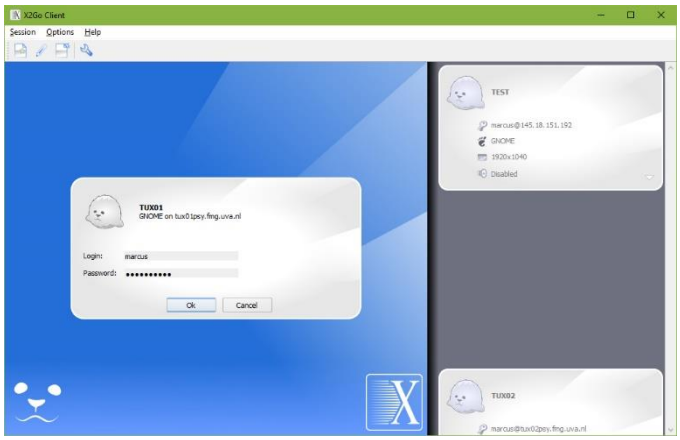
1. Give the session a name like “TUX01”
2. IP address or DNS name of the server (used the server name here)
3. Your login name
4. The desktop environment (session) should be “MATE”



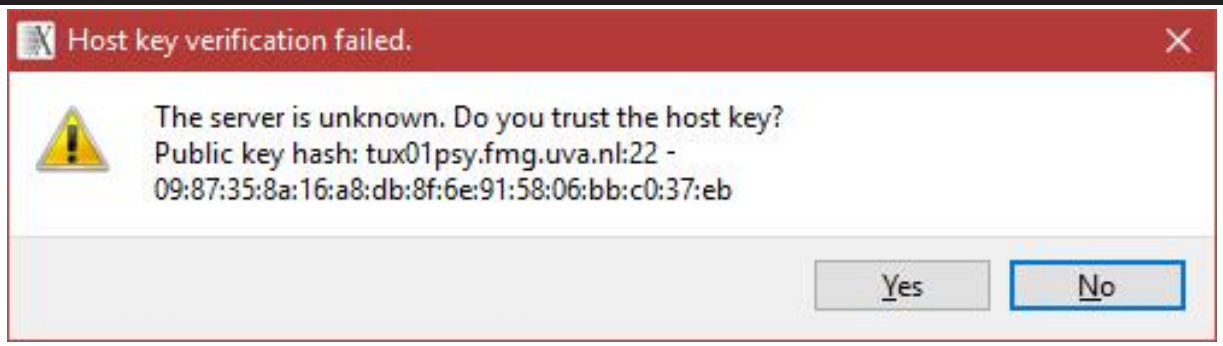
On the Connection tab you can set the “connection speed”. Default is “ADSL”. If you experience any connection issues you may want to select “ISDN”.

On the Input/Output tab you can set the Display properties of the X2Go session window. I normally prefer the “Maximum available” option.

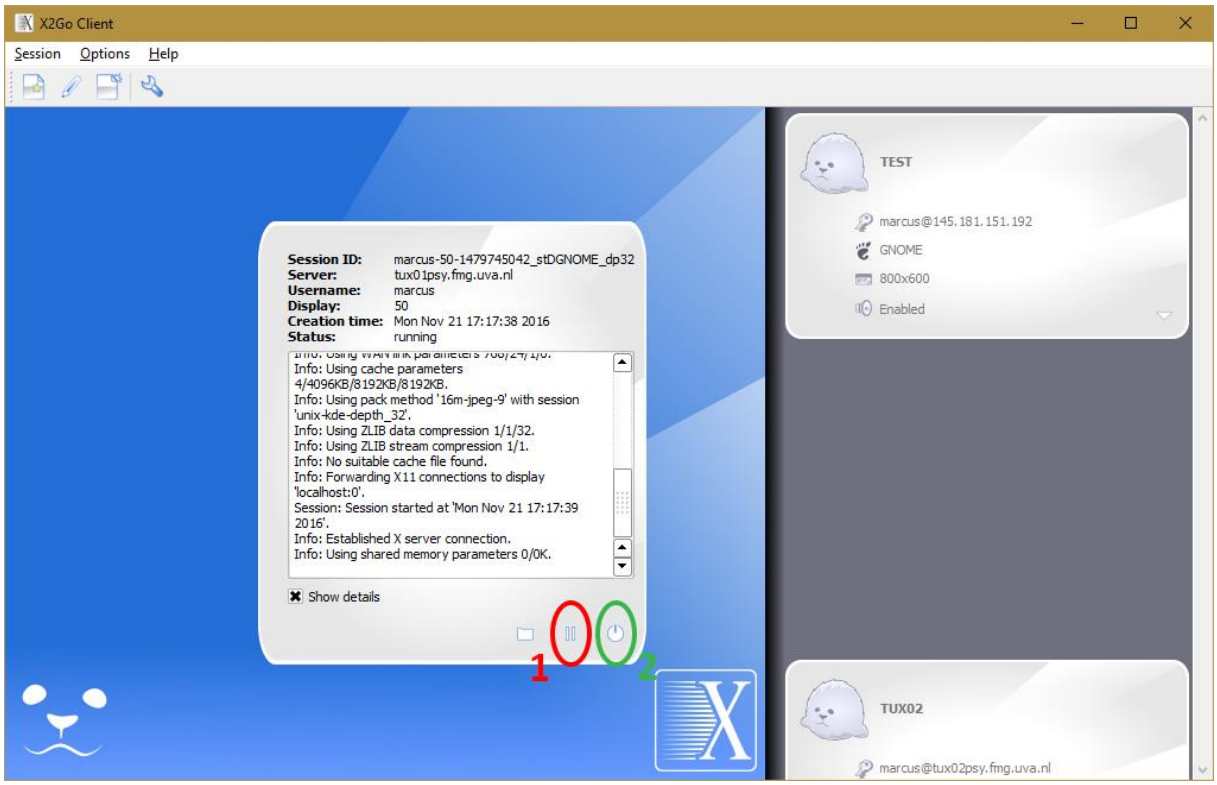
Now you can make the actual connection. Select the created session on the right. Now your session shifts to the mail window. Here you can enter your password and hit the “ok” button.



X2Go starts to connect. Your session will open in a new window. At the first login you’ll see this warning below. Click “Yes” to accept the new key:



If you want to suspend or terminate your session you can select so on the main window:



1. Suspend session
2. Terminate session

If you select “log out” from the Ubuntu menu the session gets terminated as well. On the newest Linux servers with the MATE desktop you have both the “Suspend” and the “Log

And once again:
Use logout if there are no running jobs. Only use the suspend option if you’ve got jobs running.

Change the default password

When an account is created we give you a default password. It’s best to change this password as soon as possible since the password is known in the entire lab. To change your password open a terminal window. At the prompt type “passwd <your login>” and follow the onscreen instructions. Use whatever password you like, but not something too obvious. Please note there is no “feedback” whatsoever. So you just need to type your password and

hit the <enter> key then reenter your password and hit the <enter> key again.

How to handle files

Compress if possible

An MRI dataset can be comprised of as many as one million files. This makes data transfer (a backup for example) a very time consuming process. So before you transfer any data it is highly recommended to package the files as a 'tarball'[2]. This is best done using the tar command from the command line. Don't use the "compress" option in de file manager since this option needs intermediate files, so chances are you run out of disk space.

Example:

```
tar -cvf /home/pietje/dataset_pietje.tar -C / home/pietje/data
```

c= create new archieve
v= verbosely list files which are processed
f= following is the archive file name

/home/pietje/dataset.tar -> destination 'tarball' file
-C / home/pietje/data -> source directory

The "Public" folder

The "Public" folder is available at the following location "/home/public". All users have full access to this folder. If users have decided to restrict access to their personal home, the "Public" folder can be used to exchange files. Please note this directory can be emptied at any time without any warning. All files in this folder should be therefore considered temporary.

2 A 'tarball' is similar to a ZIP file in that it contains one or more files and or directories, However, the samples shown here do not compress the data. The tarball is slightly larger than the some of the containing files.

The "CNGPP_checked" folder

The CNGPP_checked folder located at the FMGSTORAGE (in the applications folder) is automatically mapped to the following location:
/home/CNGPP_checked

All users only have read permissions for this directory. If you want things changed please contact Steven Scholte.

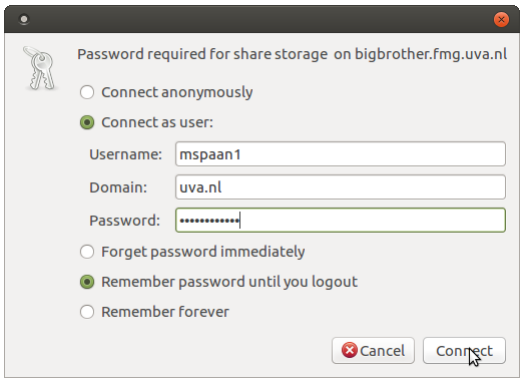
FMGSTORAGE

FMGSTORAGE is the successor to BigBrother (†) as the file server of the research institute (OZI), and is available to all departments within the faculty. From the user's point of view, FMGSTORAGE offers a number of folders or 'shares', which may be available to you, depending on the access rights granted to your UvAID. These shares may be mounted (in principle similar to a Windows 'Drive Mapping') from the MATE desktop.

The TOP SOCSCI (http://top.socsci.uva.nl/) outlines which shares are available under the heading "How to connect to the FMG Storage Server". The Mac and Ubuntu/MATE share naming conventions, as regards server names and shares.

When you click the "FMGstorage_psychology" link you will be prompted for credentials. Use your UvAnetID here. And you have to refer to the domain at this point:

- Enter your UvAnetID and refer to the UvA domain - e.g. "mspaan1"
- Domain should be something like – "uva.nl" or "UVA"
- Enter your UvAnetID password



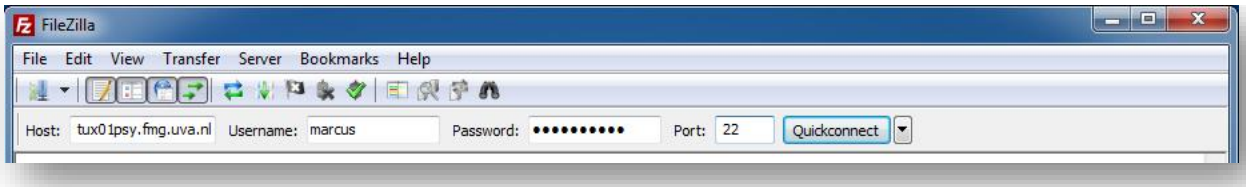
Ubuntu MATE

sFTP to your home on the TUX

Normally all files are transferred from and to FMGSTORAGE. This is by far the fastest way to transfer files. Furthermore FMGSTORAGE is the only safe location to store your data since we make a daily back-up of FMGSTORAGE.

However if you want to transfer some files from your desktop directly to or from your home folder on the TUX server you can simply use sFTP. Just install a sFTP client (like FileZilla) on your desktop and enter your server (the TUX server you use) information and your server credentials (top of FileZilla window).

Host: tux01psy.fmg.uva.nl (or whatever TUX server you use)
Username: normally your UvAnetID ("c" in front of student number)
Password: as you have entered yourself
Port: 22



FileZilla download:
https://filezilla-project.org/download.php?show_all=1

See the sFTP client documentation if you're not familiar with using a sFTP client.

Mount a BigBrother folder to your TUX home

It is possible to mount a FMGSTORAGE folder to a specific directory on the TUX. The CNGPP_checked folder is an example. This FMGSTORAGE to TUX mount is automated. But if you want there is the possibility to mount one of your folders on FMGSTORAGE as well. You'll need some extra permissions to do so. So please sent me an email and ask for the "sambashare" permissions. Once you've got these permissions you're able to make the mount yourself.

This is the command needed:

```
mount -t cifs //bigbrother/top$/spaan/folder  /home/marcus/folder -o
username=mspaan1,domain=uva,noexec
```

Please note this is one single line. And you need to make some adjustments:

Full path to the Bigbrother folder:

//bigbrother.fmg.uva.nl/share$/foldername/subfolder (if needed)

Full path to the folder were you want to mount the BigBrother folder (normally a folder in your home you just created for this purpose on the TUX):
/home/marcus/Documents/mount

username:
Your UvAnetID

Full path to the folder were you want to mount the FMGSTORAGE folder (normally a folder in your home you just created for this purpose on the TUX):
/home/marcus/Documents/mount

username:
Your UvAnetID

Once you run this command you will be prompted for a password:

This should be your UvAnetID password (not necessary the same as your Linux password).

Some instructions regarding imaging software

Configuring your account for Docker (rootless)

Docker is used by many researchers. With a few simple steps you create your own Docker environment in your home directory.

1. Open a terminal window
2. Run in the terminal:
   `dockerd-rootless-setuptool.sh install"`
   (as normal user, NO SUDO).
3. The installation script performs the install. Once it is finished it refers to two lines you need to paste in your ".bashrc" file.
4. So copy the two lines and paste them in your ".bashrc" file in your home (you may need to enable "view hidden files" in the file explorer).
5. Close the terminal
6. Open a new terminal
7. Run the following command:
   `systemctl --user start docker`
   (please note at any new session you need to run this command first to start your very own Docker).
8. To test Docker run the following command:
   `docker run hello-world`

Configuring your account for FSL 6.0

To start FSL simply open a terminal window and enter the command "fsl".

For each new user a ".bash_profile" or ".bashrc" is automatically generated. So the following information is already in your ".bashrc" (or it's corrupted). You may need to edit the file to enable the FSL version you want to use.

To Run FSL you need some specific path settings. Please note there can be multiple versions of FSL installed simultaneously. The path settings in your ".bashrc" determine which version you use at a certain time. Below the defaut configuration, but you can always install another version of FSL to your home directory. Make sure to adust the .bashrc settings if you do.

```
#############################################################
# FSL Configuration
#############################################################
FSLDIR=/usr/local/fsl
. ${FSLDIR}/etc/fslconf/fsl.sh
PATH=${FSLDIR}/bin:${PATH}
export FSLDIR PATH
```

Freesurfer user settings:

(source: http://surfer.nmr.mgh.harvard.edu/fswiki/SetupConfiguration)

For each new user a ".bashsc" is automatically generated. So you only need to make a correct reference to the directory that holds the FreeSurfer subjects data.

Freesurfer is already installed. You only need to configure your account to use Freesurfer properly. The following information is already included in your ".bashrc" file:

```
#############################################################
# FreeSurfer Configuration
#############################################################
export FREESURFER_HOME=/usr/local/freesurfer/7.2.0
source $FREESURFER_HOME/SetUpFreeSurfer.sh
```

You should however specify your own "FreeSurfer_SUBJECTS_DIR". Therefore you need to edit the ".bashrc" file. This file is located in the root of your home. Open the file browser Dolphin (Nautilus for Ubuntu). If you don't see the file in your home, make it visible (it's a hidden file). Go to "View" in the menu bar and check "Show Hidden Files". Now simply open (click) the ".bashrc" and adjust or add the line below, so it points to the (sub)directory in your home.

```
export SUBJECTS_DIR=/home/mspaan1/FreeSurfer_subjects
```

Obviously you've to replace mspaan1 with your own home directory. And make sure the sub directory exits in your home directory as well ("FreeSurfer_subjects" in example above).

Matlab

Matlab (various versions) is installed in most TUX machines, using the UvA site-license. There are lots of different toolboxes available. Please note you claim a toolbox license once you called for a function of a specific toolbox. This license in not released until you close Matlab. Certain toolboxes are quite sparse, so only claim the license if you really need it (and release it again when done).

The Freesurfer installer already creates a "startup.m" file. You can adjust this "startup.m" file to your liking.

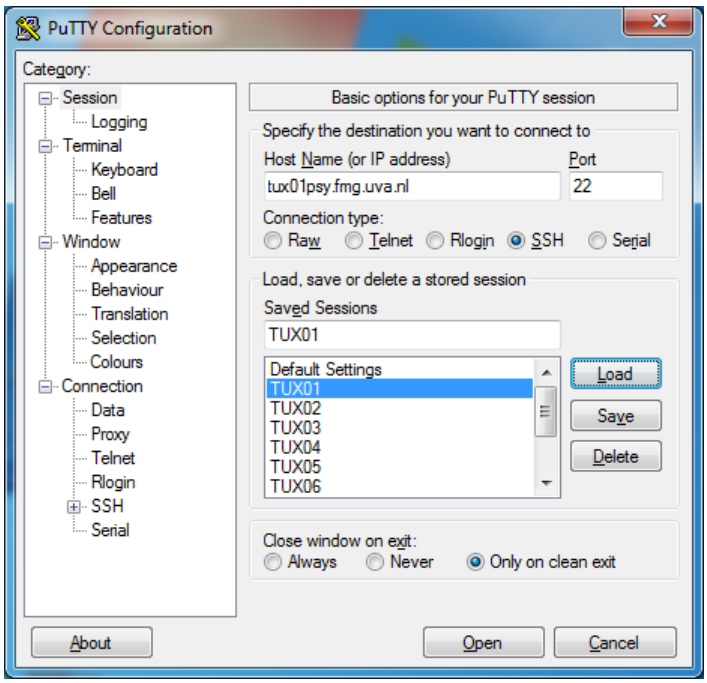
Extra

Direct SSH login

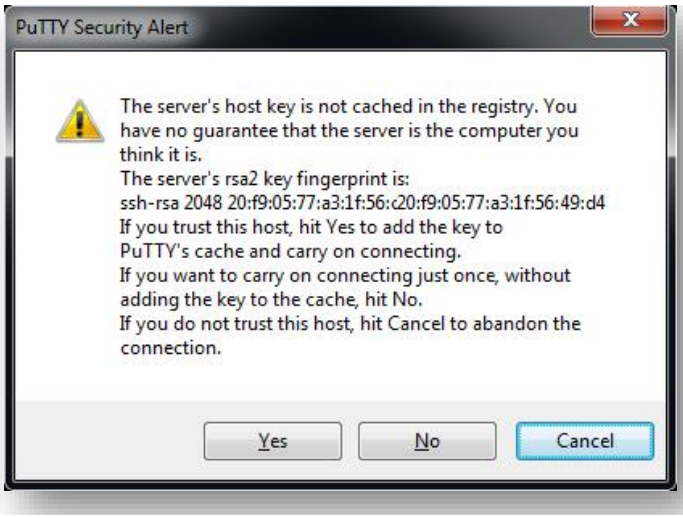
You may not always need the graphical desktop environment you get with the NXclient. Or the NXclient got stuck (frozen) and you want to remove the current not responding session. Here the SSH connection may be useful. On Linux and OSX the standard terminal already supports SSH. On windows you need to install the terminal named “PuTTY”. You can download PuTTY from the following location:

http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html

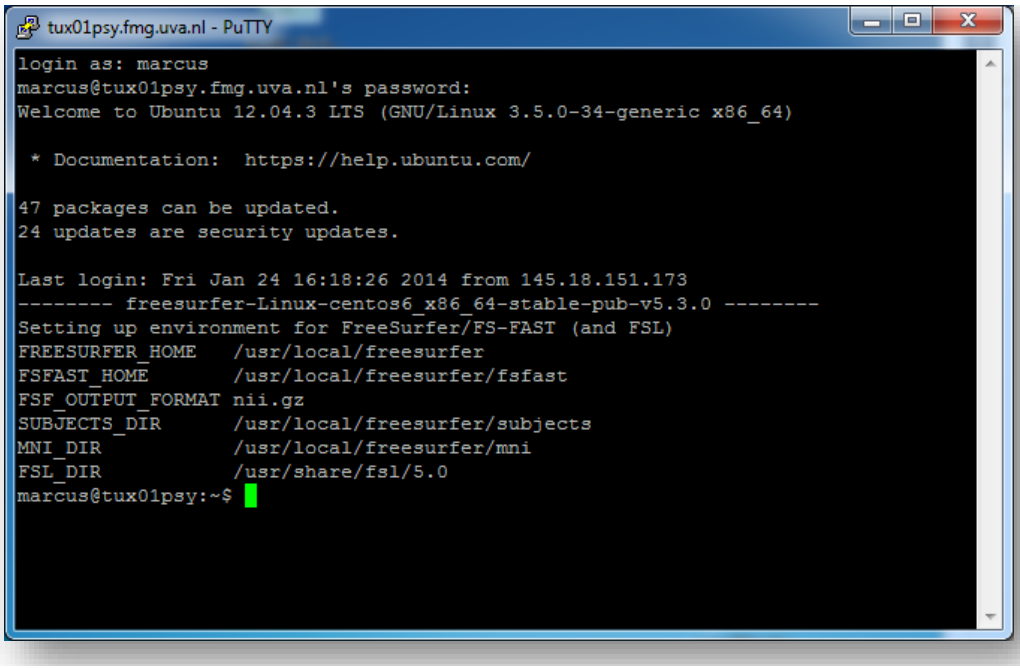
All you need to do to connect is to enter the server host name and make sure port 22 is selected.



At the first logon you need to “trust” the TUX security key:



On the command line you can just enter your server credentials and then you're connected



Once you're connected to the TUX server you can do all command line stuff from this remote terminal window.

Troubleshooting X2Go Connections

(source: http://mindhive.mit.edu/nx-troubleshooting)

How to remove a non-responding (freezed) X2Go session from the TUX server yourself:

1. Make sure to terminate the X2Go session(s) to the TUX server and make sure the X2Go client is closed.
2. Make a SSH connection to the TUX server as explained above.
3. In your home directory, move your .x2go directory to .x2go -OFF by running the following command:

```
mv ~/.x2go ~/.x2go-OFF
```

4. Since the .x2go session files are not in place anymore you can try to start a new X2Go session (from your regular X2Go client side desktop/notebook).
5. If the connection works, and you get logged in, you're all set. If not, move on to step 6.
6. Close the X2Go client application.
7. On your personal workstation or laptop, also remove the ".x2go" directory in your home directory. On Windows platform, you might need to select to view hidden files to see it. On windows 7/8/10 the location is "C:\Users\<user name>"
8. Launch a new NX Client session.
9. If it works, you are all set. If not, go ahead and email your friendly neighborhood sysadmin.