**Accessing the Teaching Linux Farm remotely from Mac or Linux systems**

Many/most of the software required for taught courses is available on the department’s teaching Linux farm, which can be accessed from home machines (desktop or laptop). This uses a **Secure Shell** connection (SSH). Both Mac and Linux systems typically include an `ssh` client as part of the standard installation – Windows systems may require additional software to be installed to provide this functionality.

For both Mac and Linux systems, the first step is to start a **Terminal** application. This will display a terminal window, where commands can be given to the local system. (The screenshots shown here are from a Linux system – the behaviour on a Mac will be very similar)

There are (currently) eight systems making up the teaching Linux farm – these are named `lxfarm01.csc.liv.ac.uk` through to `lxfarm08.csc.liv.ac.uk`. The available software and configuration of these systems should be exactly the same – you can choose any one of these machines. If a particular machine is not available (or seems overloaded), simply disconnect and choose a different one.

**SSH connection**

To connect to one of these systems, type the command `ssh` into the **Terminal** window, together with your University username, and the name of the chosen machine (separated by the `@` sign). Then press Return

(Note that if your username on the local machine happens to be the same as your University username, then you can omit the `username@` element. But if in any doubt, keep it in)

The very first time that you connect to a particular machine, you will be asked to confirm that this is the system you expect – in most circumstances this **digital fingerprint** is pretty meaningless, so just type `yes` (followed by Return)

The next time you connect **to the same machine**, the fingerprint will be checked automatically, and you should not be prompted for this again (as long as the fingerprint matches). If you choose a different system within the teaching Linux farm, then you’ll get a similar prompt for that new machine (but with a different fingerprint).
You will then be prompted to enter your University password.

Note that this whole connection is encrypted, so the password (or anything else you type) cannot be intercepted or read while crossing the Internet. This is the same idea as secure web pages (https).

**Two factor authentication**

Following an increase in security exploits targeting universities in recent weeks, there is now a second authentication step required before you can start using these systems.

Once you have supplied the username and (correct) password, you will be asked to select a Duo Push challenge to a registered device (typically a mobile phone or tablet) and confirm this request via a dedicated app running on that device.

Alternatively, you will have the option to generate a challenge code, sent by SMS text message to your registered phone, which should then be entered on the terminal.

Note that in both cases, you will need to have registered your phone (and/or other device) with the University two-factor authentication scheme before starting to use the teaching farm systems. This can be done via the URL [https://duoenrolment.liverpool.ac.uk/](https://duoenrolment.liverpool.ac.uk/)

The system lxfarm08.csc.liv.ac.uk is configured slightly differently, and will not offer this choice of options – instead it will automatically send the challenge to the primary registered device. This is to aid with SSH-tunnelling services (such as MySQL Workbench, or remote file editing) where the terminal prompts are not always visible or interactively accessible.

There is more information about the University’s Duo two-factor authentication mechanism at [https://s.liv.ac.uk/708](https://s.liv.ac.uk/708)
Shell session

Once you have confirmed the login request (either via the Duo mobile app, or the SMS code), you will be logged into the chosen system, and can run Linux commands on that machine. For text-based commands, the output will be shown in the same Terminal window – graphical commands should open up a new window on your local display. If this does not happen (and you need to run such a graphical application), then disconnect from the Linux system (see below), and re-connect using the command

```
ssh -X username@lxfarmNN.csc.liv.ac.uk
```

Note that immediately after logging in, you will be informed of the time and source (IP address) of the last successful login session. (Note that one consequence of introducing the Duo two-factor authentication is that this will now always be reported as a numeric IP address).

If you do not recognise this connection, please inform the CS technical team immediately by emailing CSC-HELPDESK@liverpool.ac.uk. You may also wish to change your password.

When reporting this, or any other issue with the system, it is extremely helpful to include details of which Linux machine you were using (which should now appear as part of the command prompt), and the date & time any problem occurred. If you’re not sure which system you’re on, the command hostname will also show this information (see above).

When you have finished with the session, use the command exit to disconnect, and return you to the local machine. You can then close the Terminal window, as usual.

Note that closing the Terminal window without first exiting from the Linux system may leave processes running on that Linux farm machine, and could cause problems in the future.