Configuring your Apple Mac Computer for Remote Course Work Modules

EJP, version 2.0 May 2020

Introduction

This document is for Engineering Students in the University of Oxford that want to use an **Apple Mac** computer for Course Work Modules. There is a separate document for if you are using Window 10.

Contents

Applications on your Mac

This section takes a brief tour of some of the applications on your Mac.
This includes, Numbers, Text Editor and Terminal. You will need the Terminal App to use Python.
See **page 18**

Python

Some of the Course Work Modules use the Python Programming language.
Python comes with your Mac. This section explains how to use it.
See **page 20**

MATLAB Toolboxes

You may have to add extra MATLAB toolboxes for some of the Course Work Modules.
For example, the Lego Football Course Work Module uses Simulink.
This section :-

- Reminds you how to install MATLAB.
- Shows how to check what toolboxes are installed already.
- Shows you how to install extra toolboxes.

See **page 21**

Remote Logging into Linux Computers

In some Course Work Modules, you login to a remote Linux computer and run applications on the remote computer.
See **page 22**

Remote Logging For Computational Fluid Dynamics

Is only required if you are taking the Computational Fluid Dynamics Course Work Module.
See **page 25**

System Requirements

A list of which Operating System the applications will work with.
See **page 26**

What do I need to do?

For all Course Work Modules

Most Course Work Modules are going to use Teams. We will be using Teams to help you set up your Mac. So one of the first things you should do is :

Install the **Teams app** on to your Mac. Page 7

The table below summarizes what applications you will need for different Course Work Modules.

Course Work Module	VPN	Remote Desktop	Remote Login
Mechanical CAD	✔	✔	
Turbomachinery CAD	✔	✔	
ECAD CWM	✔		✔
3D Printing CAD	✔	✔	
Civil Engineering	✔	✔	
AI & Python			
Biomedical Engineering			
Lego Football			
High Performance Computing	✔		✔
Chemical Engineering	✔	✔	
Finite Elements for Solids and Structures	✔	✔	
Computational Fluid Dynamics	✔		✔
Business Laboratory			
Formula 1	✔		✔
Optical Engineering of Biomedical Microscope			

If your Mac is over 4 years old, please check out the system requirements on page 26.

Course Work Modules Using Remote Desktop

If you are taking the any of the following Course Work Modules

Mechanical CAD
Turbomachinery CAD
3D Printing CAD
Civil Engineering
Chemical Engineering

Then you need **VPN** and the **Remote Desktop App**. Page 9 and 11

Course Work Modules Using Remote Login

If you are taking the any of the following Course Work Modules

Computational Fluid Dynamics
High Performance Computing

Then you need **VPN** and **Remote Login**. Page 9 and 22

Course Work Modules Using AWS

The following Course Work Modules use Amazon Web Services (AWS).

ECAD
Formula 1

The Course Organisers will instruct you how to interface with Amazon Web Services

Nexus 365

Many of you will already be using Nexus 365 for email. If you are not already using Nexus 365, then follow the instructions here to get started.
https://help.it.ox.ac.uk/nexus365/getting-started

Here you will find :-

Outlook

The Microsoft email client to view your Oxford University emails.

OneDrive

A cloud based filing system. You can share files with other people within the University.

Word

The Microsoft word processor.

- You can save files as a Word document(.docx) to **One Drive** or your **Mac**.
- Save file in **ODT** format to your **Mac**. Only useful if you have Libra or Open Office.
- Save as a **PDF** file to your **Mac**.

Excel

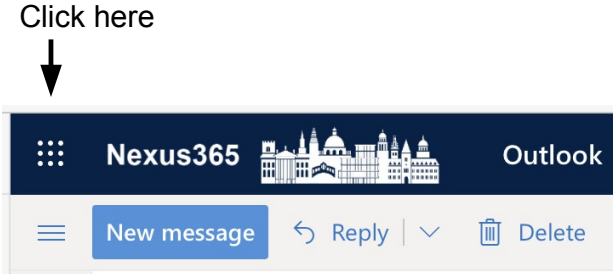
The Microsoft spreadsheet.

- You can save files as an Excel spreadsheet(.xlsx) to **One Drive** or your **Mac**.
- or you can save in ODS format to your Mac. For opening in Libra or Open Office.

If you create a file on OneDrive using Word or Excel, don't worry if you can't delete it. You will be able to delete it tomorrow.

When running one of the applications, you can select other applications by clicking on the dotted icon on the left of the banner.

Click here



For more information on Nexus 365 see
https://help.it.ox.ac.uk/nexus365/index

Teams is a part of Nexus 365. See the next section.

The Teams App

Teams is an online chat and conferencing tool. It will be used on most of the Course Work Modules. Unfortunately, it does not work in Safari web browser. The best way to overcome this problem is to install the Teams App.

Installing the Teams App

Go to the web site
https://products.office.com/en-gb/microsoft-teams/download-app

There are two **Download Buttons**. Select the one in the centre, under the Apple.

After the download has completed, in **Finder** go to the **Downloads** folder and double click on **Teams_osx.pkg** to install.

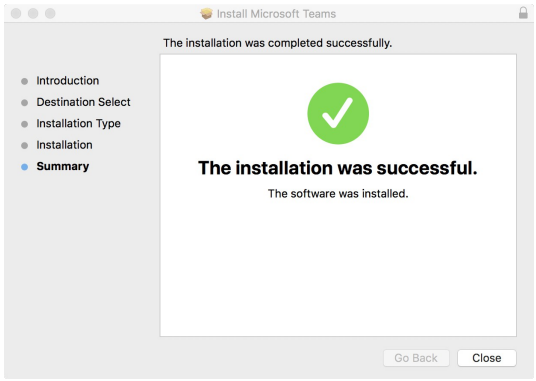
The installation is very straightforward.
You just keep hitting the button in the bottom right hand corner.

Introduction Hit **Continue**

Installation Type Hit **Install**

Then enter your Mac **Username** and **Password** .
This is as used to login to the Mac.

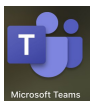
You get a big tick when it has finished installing.



Running the Teams App

Click on the **Launchpad** on the **Dock**.

Then Click on Microsoft Teams

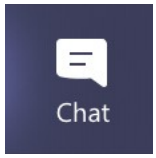


Sign in using **abc123@OX.AC.UK**
Replacing **abc123** with your own Signal Sign On (SSO) username.

Then login using your Oxford University SSO and password.

Sometimes it capitalizes the first letter of the SSO. If it does this, change it back to lower case.

Testing Teams



You need the help of a friend in Oxford.
Right click on the **Chat** icon and select **New chat**.
Then enter the name of your friend.

Enter a message in the box at the bottom.

Try out the Video and Audio call.

VPN

Most computer systems within the University are not accessible from networks outside the University for security reasons. VPN (Virtual Private Network) allows you to connect to the the University Network as if your computer was connected within the University.
You need to connect to the University using VPN before you can Remote Desktop.

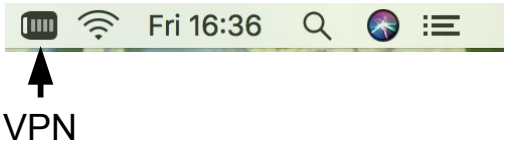
Before using the Oxford VPN server, please read the following :-
https://help.it.ox.ac.uk/network/vpn/index

You need a **Remote Access Password** to use VPN. This is different to the password that you use to login in the Engineering Department and different to the password that you use to access University resources such as your email.
You can self register or reset your **Remote Access Password** at
https://register.it.ox.ac.uk/self/remote_access

You don't have to install anything with a modern Mac. VPN comes with the computer. All you have to do is configure it to connect the the University VPN Server.

There is a nice set of instructions on the University IT web site.
https://help.it.ox.ac.uk/network/vpn/macos/index

When following the instructions, I strongly recommend that you tick **Show VPN in menu bar**. This puts a VPN icon to the right of the menu bar along the top of your screen.



VPN

If you forget, you can tick the box later.
System Preferences ► Network ► VPN ► Show VPN in menu bar

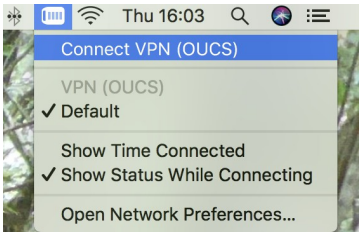
Testing VPN

The easiest way to check that VPN is working is to look at the Department of Engineering Science Internet page on the web.
www.eng.ox.ac.uk

Then click on the **intranet** link on the right of the banner.

Without VPN you will be **Forbidden** from accessing this page.

Now connect to the OUCS VPN server.
You do this by clicking on the VPN icon on the right of the menu bar.
Select **Connect VPN**.



Now try getting to the **Intranet** again.

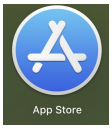
Remote Desktop

Some of the Course Work Modules will use a Windows PC in one of the Laboratories in the Engineering Department. To do this, you will use the **Remote Desktop App**. This allows you to take over the desktop of the Windows PC from your Mac and use it as if you were sat in front of the PC.

Installing the Remote Desktop App

This is a free download from the Apple App Store.

Click on the **Launchpad** on the **Dock**. 

Then click the **App Store**. 

Search for Microsoft **Remote Desktop 10**. 

Go to the link.

Click on **Get**.

Testing Remote Desktop

To test the Remote Desktop, you will be allocated a computer in one of the teaching Laboratories in the Department, for some period in week 3 or 4 of trinity term.

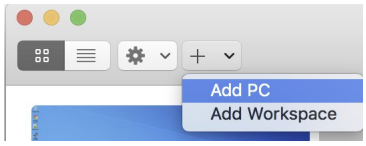
In the following, replace **engs-dopc00.eng.ox.ac.uk** with the name of the computer allocated to you.

Adding a PC to the Remote Desktop App

Click on **Launchpad** on the **Dock**.

Click on **Remote Desktop 10** icon.

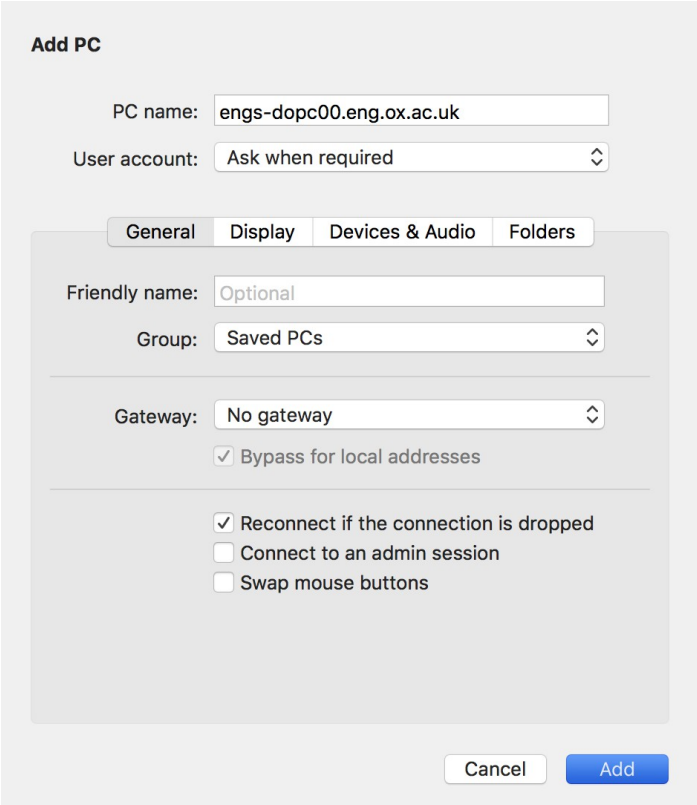
Click on the **+** button
Select **Add PC**



Replacing **engs-dopc00** with the name of the PC you have been allocated.

In **PC name:**
You enter **engs-dopc00.eng.ox.ac.uk**

For **User account**:
select **Add User Account...**

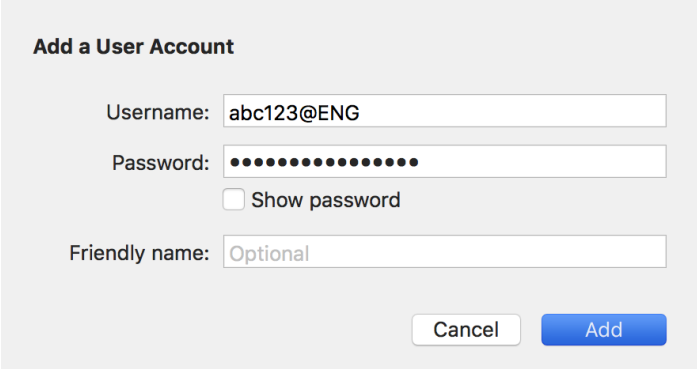


Replacing **abc123** with your own SSO

For Username:
Use **abc123@ENG**

Then enter your **Password:**

This is the password you use to login into the computers in the Engineering Department.

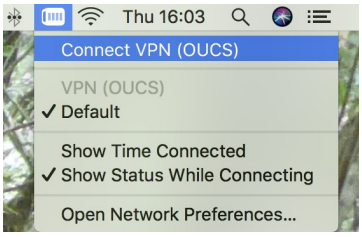


Click on **Add**

Click on **Add** in the **Add PC** window

Opening a Remote Desktop to the PC

Connect to the OUCS VPN server.
You do this by clicking on the VPN icon on the right of the menu bar.
Select **Connect VPN**.



In the **Remote Desktop App**.
Double click on the PC added previously.

If you get a warning that **certificate could not be verified**, hit **continue**.

Switching Desktops

The **F3** key shows all the available Desktops, including the Windows PC.
Click on the Desktop you want.

A quicker way to switch Desktops: holding down the control key and pressing the left or right arrow key.

Keyboard Mappings

Unfortunately, the Windows computers in the Department use different keyboards to the Mac. Sometimes, you press a key on the Mac and get a different character on the Windows PC. The table below tells you which key to press on the Mac to get a particular character on the windows PC.

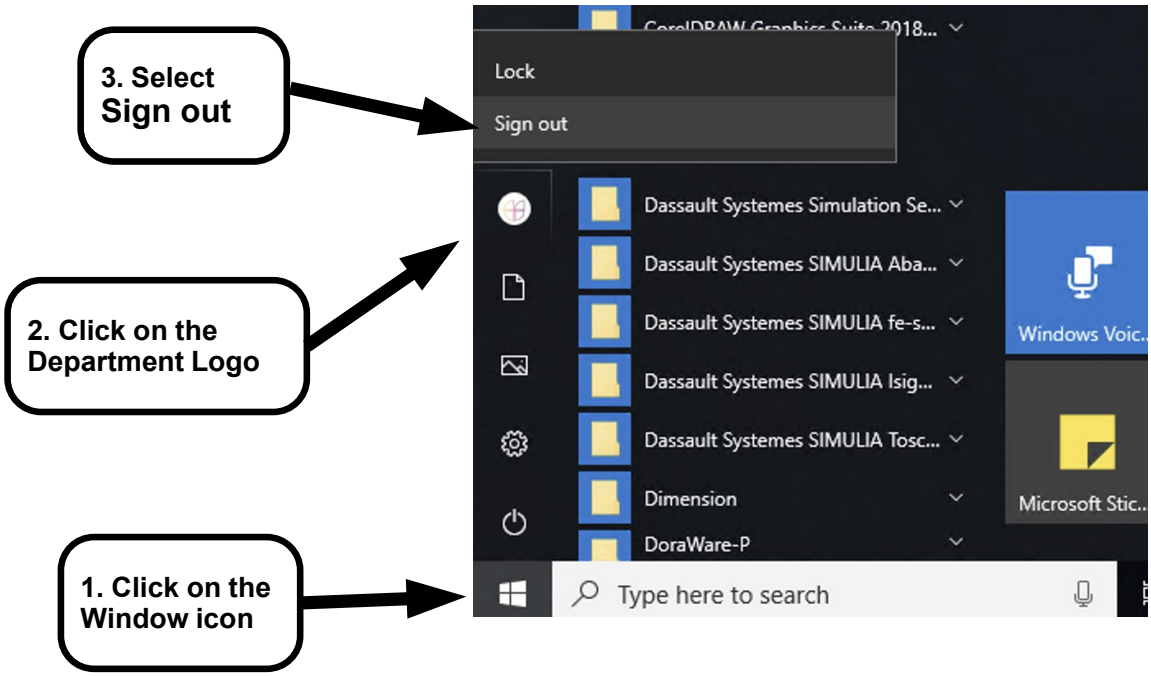
Character on Windows PC	Key you press on the Mac	Hints
\	`	Same key as ~, next to left shift key.
#	\	Next to enter key.
"	@	Shift 2
@	"	Double quotes
|	~	Next to left shift key
~	|	Shift \
'	'	Forward quote, under double quote.
`	§	Below **esc**

Examples

To enter	You type
abc123@OX.AC.UK	abc123”OX.AC.UK
cd H:\Year2\CWMs\MCAD	cd H:`Year2`CWMs`MCAD

IMPORTANT

Please do not just close the connection. When you have finished using the remote computer, you must **Sign out** and NOT shutdown the computer.



If you don't sign out, nobody else will be able to use this computer.

DO NOT SHUT DOWN THE PC. If you shutdown the PC, somebody has to go into the Department to turn the computer on again.

Only one person can remote desktop to a Windows PC at any one time. When you use remote desktop in a Course Work Module you will be allocated a Windows PC.

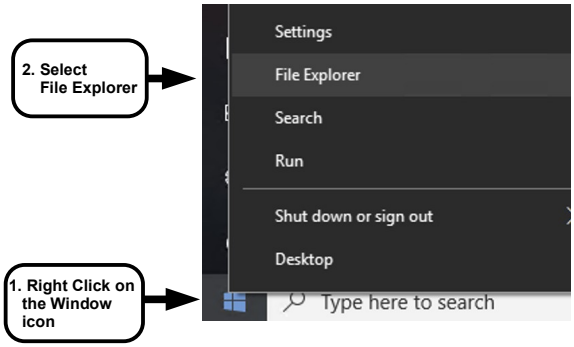
You use different PCs in different Laboratories. It is very likely that you will be allocated a different PC for each Course Work Module that will be different to the PC used for testing.

Only use the PC you have been allocated in the week of your module.
In other weeks the PC will be allocated to another student.

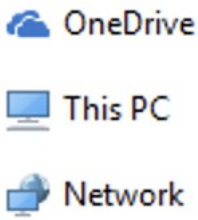
Copying Files Between Computers

Open **File Explorer** on the PC.

If you cannot find it, right click on the window icon and select **File Explorer**.



Select **This PC** in File Explorer, you will see a drive with your SSO. Select this drive. This is the **H:** drive, your Home.



You may be able cut and paste files from **Finder** on the Mac to **File Explorer** on the PC and visa versa. Unfortunately, this is not guaranteed to work on all Windows computers.

OneDrive

Alternatively, you can cut and paste to **OneDrive**. On the left hand side of **File Explorer**, **right click** on the **OneDrive** icon. Select **Open in new window**.

The first time you do this, you have to login to your nexus 365 account. Replacing **abc123** with your own Signal Sign On (SSO) username.

Sign in by entering **abc123"OX.AC.UK**	This will map to **abc123@OX.AC.UK** on the Windows PC

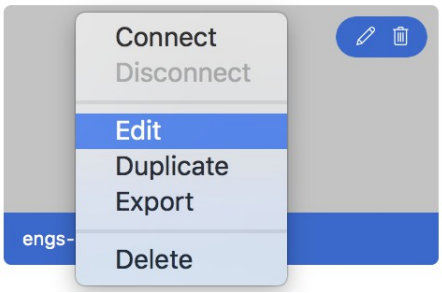
Using a Folder on your Mac.

Another way of transferring files, is to give the remote computer access to a folder on your Mac.

Sign Out of the Remote PC

In Finder on the Mac, create a new folder called **MOUNT** in **Documents**.

In the **Remote Desktop App**,
Right click on the PC icon and select **Edit**.

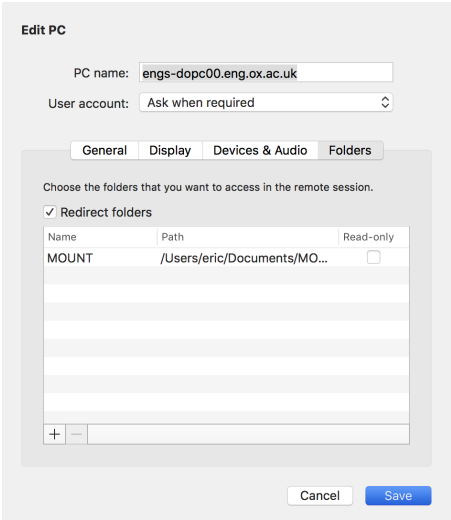


Select the **Folders** tab in **Edit PC**

Tick **Redirect folders**

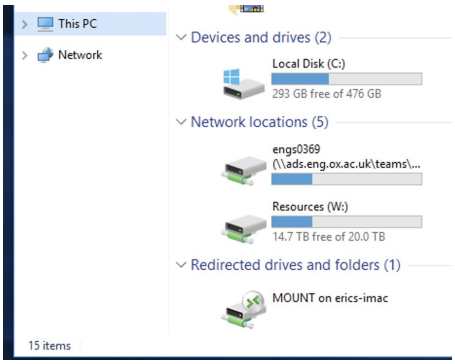
Hit the plus (**+**) at the bottom.
Select **Documents/MOUNT**

Then hit the **Save** button



In the **Remote Desktop App**.
Double click on the **PC**

On the remote PC, open **File Explorer**
On the left, select **This PC**
The redirected folder is at the bottom.



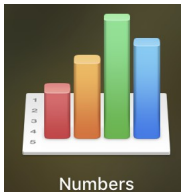
Applications on your Mac

Click on the **Launchpad** to see the apps on you Mac.

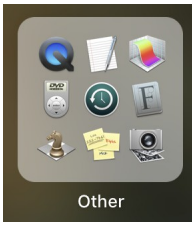
Pages

The Apple Word Processor. Only Mac users can open a pages file. However, you can select **Export To**, from the **File** menu. This allows you to save in different formats. The **pdf** format file is readable by everybody. You can also **Export To** a Microsoft Word document. This seemed to work well when I tried it, but I would not guarantee that it will work with everything. If you don't have Word on your Mac, double clicking on a Word Document(.docx) in **Finder** will open the file in **Pages**.

Numbers



The Apple Spreadsheet. Numbers files can only be opened on a Mac. Just like Pages, you can **Export To** a **pdf** or **Excel** formatted file. You can open an **Excel** file in Numbers.



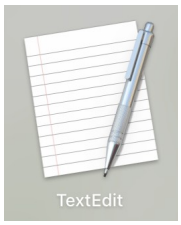
Click on the **Others.**

Here you will find :-

Grab

This allows you to save the screen, a selected region of the screen, or a window to a picture file.

TextEdit



The Apple Text Editor. This works with two different types of files.
The **Format** menu allows you to select :

- **Plain Text** format just contains ASCII character codes.
  You can't change the font. These save to **.txt** files.

- **Rich Text** format contains extra formatting codes for changing the font and size of the text and other formatting commands. These save to **.rtf** files.

Try the following :-

Open **TextEdit**

Select **New Document**

In the **Format** menu select **Make Plain Text**

Enter the following text into the document :-

Hello everybody
How are you

Save as **Example.txt** in your **Documents** folder.

Terminal

This is a terminal Window, just like the terminal window on a Linux computer.
Try the following commands :-

Command	Explanation
pwd	Print working directory. You start in your Home directory. Indicated with the house in **Finder**. Directory and Folder are the same thing.
cd Documents	Change directory to the **Documents** directory.
ls - l	List the contents of this directory. (-l is - Lower case L) You should see **Example.txt** created above.
cat Example.txt	Show the contents of the file.
cat Example.txt | say	Say the contents of the file. (Shift \ gives |)
cd ..	cd up one level, back to your home.

For a list of Mac OS commands, see http://ss64.com/osx

Python

Python comes preinstalled on a Mac.

Open a **Terminal** App as shown above and enter the following.

python	Start the Python interpreter.
1+2	Type in some Python commands
quit()	Exit Python

It is better to use the Python Integrated Development Environment (IDLE)

cd Documents	Change directory to the **Documents** directory.
mkdir Code	Make a new directory called **Code**.
cd Code	Change directory into **Code**
idle	The Python Integrated Development Environment

This opens in a **Python Shell** window. You can enter Python commands in this window.

Click on the window.
On the banner at the top of the screen, select **New** in the **File** menu.

Enter the following Python program:

```
for n in range(5):
    print n
```

Save as **Example.py**

Select **Run Module** in the **Run** menu**.**

Python Tutorial
https://docs.python.org/2.7/tutorial/index.html

IDLE tutorial
http://www.hashcollision.org/hkn/python/idle_intro/index.html

Adding Toolboxes to MATLAB

You may need to add a toolbox to MATLAB. For Example, the Lego Football Course Work Module uses **Simulink**.

Installing MATLAB

Most of you will have already installed MATLAB.
If you need to install MATLAB See :
http://www2.eng.ox.ac.uk/~labejp/TAH/MATLAB_Install.pdf

What Toolboxes are Installed?

Enter the **ver** command into the MATLAB command window.

Adding a Toolbox

Assuming that you want to add **Simulink**.

Click on the **Add-Ons** icon on the MATLAB Home banner.

Search for **Simulink** in the **Add-On Explorer**.

Select **Similink**.

Click on **Sign In to Install**.

When you have signed in, click on **Install**.

Remote Logging into Linux Computes

Where as Microsoft Windows uses Remote Desktop to take over the remote computer, Linux and other UNIX based operating systems are multiuser. Several people can login and use the computer at the same time. From a terminal on your Mac, you can login to a remote computer. The terminal on the Mac effectively becomes a terminal on the remote computer. Because the operating system on your Mac is also based on the UNIX operating system, it is fairly easy to do this.

We are also going to use the X Windows System. This allows application that you open on the remote computer to be displayed on your Mac. XQuartz is the X Windows System for Macs.

Installing XQuartz

Goto the XQuartz download page.
https://www.xquartz.org

Under **Quick Download**, click on **XQuartz-2.7.11.dmg**
The file goes into your **Downloads** folder, on your Mac.

In **Finder**, go to **Downloads** and double click on **XQuartz-2.7.11.dmg**

In the window that opens, double click on **XQuartz.pkg**
This starts the Installer.

Just keep hitting the button in the bottom right hand corner.

Testing Remote Login

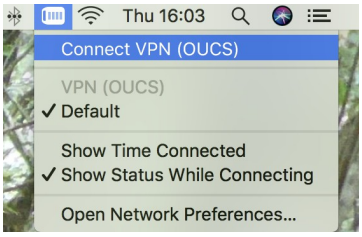
We are going to use the computers in Software Laboratory B, to test remote login.
If you need to use remote login, you will be allocated a computer in Software Laboratory B for some period in week 3 or 4 of Trinity term.

In the notes that follow, where you see **engs-station99.eng.ox.ac.uk** replace this with the name of the computer you have been allocated.

YOU WILL NOT BE ABLE TO REMOTLEY LOGIN TO **engs-station99.eng.ox.ac.uk**
This computer does not exist.

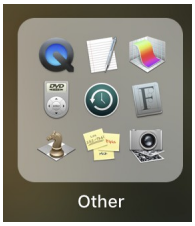
Remote Login

Connect to the OUCS VPN server.
You do this by clicking on the VPN icon on the right of the menu bar.
Select **Connect VPN**.



Click on the **Launchpad** to see the apps on you Mac.

Click on the **Others.**



Click on the **Termina**l App.

In the terminal, enter the following to remotely login

ssh -X abc123@engs-station99.eng.ox.ac.uk

The command written above will not work as it is a fictitious user logging into a fictitious computer. Replacing **abc123** *with your own SSO.*
Replacing **engs-station99.eng.ox.ac.uk** *with the computer that has been allocated to you.*

Then enter your **password**.

This is the password you use to login into the computers in the Engineering Department.

Don't worry if nothing shows when you type in your password.
For security reasons the password is NOT printed in the terminal.

If it works, you will see the command prompt. It will look something like this :
abc123@engs-station99:~%

So you are now logged on the remote computer.

To test that XQuartz is working, enter
matlab &

Putting the "**&**" sign after the command, will allow you to type other commands in the terminal while MATLAB is running. If you forget this, you will not be able to use the terminal window until you have shutdown MATLAB.

If XQuatz is working, a MATLAB window will open up on your Mac. This is not running MATLAB on your Mac, it is running MATLAB on one of the computers in Software Laboratory B, which is displaying the MATLAB window onto your Mac.

Quit MATLAB

If you are not doing The Computational Fluid Dynamics Course Work Module.

That is all you need to do.

To finish, enter **logout** in the terminal
logout

Remote Login For Computational Fluid Dynamics

If you are doing The Computational Fluid Dynamics Course Work Module, then you will be using the the Computers in Software Laboratory B. We want to tell you a bit more about mounting your home directory and running Fluent.

To mount and access you home directory, enter the following commands:

Command	Explanation
kinit	This allows you to mount your home directory.
Your password	The same password as used above.
mount /mnt/labb	Mount the disk drive with your home directory onto this computer.
cd /mnt/labb/student/u18/abc123	Replacing **abs123** with your own SSO. **C**hange **d**irectory to your home directory. Folder and directory is the same thing.

If the above does not work, do it bit by bit

cd /mnt/labb/	**C**hange **d**irectory to mounted drive.
ls	Show what files and directories are in this directory.
cd student	**C**hange **d**irectory to the **student** directory.
ls	Show what is in this directory.
etc	

Try the following :

Command	Explanation
ls -l	Show what files and directories are in are in your home directory.
ls -l | more	If the output of any command is too large for the terminal window, you can display a page at a time by piping the output of the command into **more**. The **|** character is **shift ** Hit the space bar to move to the next page.
mkdir CFD	Create a new directory (folder) for the CFD Course Work Module.
cd CFD	**C**hange **d**irectory to the new directory.
gedit ReadMe.txt &	Edit a new file called **ReadMe.txt**. In the editor enter “Files for CFD” and save. The ampersand (**&**) creates a separate process stream for the editor, so that you can use the editor and the terminal window at the same time. Without the ampersand, you will not be able to use the terminal until you quit the editor.
xterm &	Open a new terminal window.

Running Fluent

Fluent is the application you use in the Computational Fluid Dynamics Course Work Module.

Command	Explanation
start_ansys	Ansys is the software package that contains Fluent.

This will open a new terminal window on your Mac.
The environment inside this terminal is different. The location of the ansys software is known, so all you have to do is to type the name of the software you want.

There are two pieces of software that you can run from here

fluent	Computational Fluid Dynamics Simulator.
icemcfd -x	A mesh generator for fluent **-x** is required when using remote access. It tells icemcfd to use X Windows.

Logging Out

Close all applications running on the remotes computer, except for the original terminal that you used to remotely login.

Command	Explanation
cd	Return to you original location, off the disk with your home directory.
umount /mnt/labb	unmount the disk drive with your home directory onto this computer. If you have any other applications running on the remote host, an editor, another terminal window, fluent, this will not let you unmount the drive. Shut everything down and try again.
logout	Logout of the remote computer.

For a list of Linux commands, see http://ss64.com/bash

System Requirements

To see what operating system you are using :-
Click on the apple in the very top, left corner of the screen and select **About This Mac**.

To the best of my knowledge, this list shows you which Mac operating systems can be used with the various applications in this document.

Mac Operating System		**Release Date**	**VPN**	**Teams**	**Microsoft Remote Desktop 10**	**Quartz**
Catalina	macOS 10.15	2019	✓	✓	✓	✓
Mojave	macOS 10.14	2018	✓	✓	✓	✓
High Sierra	macOS 10.13	2017	✓	✓	✓	✓
Sierra	macOS 10.12	2016	✓	✓	✓	✓
El Capitan	OS X 10.11	2015	✓	✓		✓
Yosemite	OS X 10.10	2014	✓			✓
Mavericks	OS X 10.9	2013	✓			✓
Mountain Lion	OS X 10.8	2012	✓			✓
Lion	OS X 10.7	2011	✓			✓
Snow Leopard	OS X 10.6	2009				10.6.3
Leopard	OS X 10.5	2007				

Old Operating Systems
This is an issue unrelated to the Course Work Modules. If you are using a Mac operating system that is over 3 or 4 years old, then it is likely that your Mac is not getting any security updates any more. Without security updates, you and the data on your computer are vulnerable. If it has been a very long time since your Mac told you it needed an update, then this is something you should think about and investigate.

I am not an expert in this area, so the only advice I can give, is to find somebody that can advise you. The Department or Central IT cannot help with this, so you would need to find another source of support. Perhaps your nearest Apple supplier.

Apple offer a service to upgrade your Operating System to a newer version, which will include security updates. Information can be found here:
https://support.apple.com/en-gb/HT201475

For more comprehensive instructions, see Macworld:
https://www.macworld.co.uk/how-to/mac-software/update-mac-os-3521995/

Important: Upgrading an Operating System is not a task to be undertaken lightly, and before hand you not only need to carefully back up all your data, but you also need to consider where you will get help if something goes wrong.

Not all Macs can be upgraded to the latest operating system. A newer operating system on an old computer can make it slower. Do your own research for your specific computer. The Macworld site above will help you. If your computer hardware is too old to handle an upgrade, consider reaching out to your college to see if there are bursaries for new computers.