**OGRE installation guide**

This file lists all of the prerequisites for OGRE and how to install them on a Mac.

OGRE should work on Linux systems as well. Install all the same components (unless otherwise noted), but the installation processes will differ.

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**Basics**

**Command Line Tools (Mac only)**:

If you are sitting at the machine, then in the terminal

% xcode-select --install

If you are working remotely, such as from MobaXterm

% touch /tmp/.com.apple.dt.CommandLineTools.installondemand.in-progress;

% PROD=$(softwareupdate -l | grep "\\*.\*Command Line" | tail -n 1 | sed 's/^[^C]\* //')

% softwareupdate -i "$PROD" --verbose;

If the operating system has been updated, then

% xcode-select -p

will return the active developer directory (eg /Library/Developer/CommandLineTools), but don’t be fooled, the Command Line Tools still need to be reinstalled.

**Homebrew (Mac only):** <http://brew.sh>

% PATH=/opt/homebrew/opt:$PATH

% brew install coreutils

To set up your zsh environment to use homebrew, from your home directory:

% echo 'eval "$(/opt/homebrew/bin/brew shellenv)"' > .zprofile

**Python**:

Install via homebrew:

% brew install python

Alternatively, install from python.org/downloads

% python3 -V # check your python version

% which python3 # where you’re getting it from

Ex. At python.org, right click on the “macOS 64-bit universal2 installer” and “copy link address”.

% curl -O <https://www.python.org/ftp/python/3.12.2/python-3.12.2-macos11.pkg>

% sudo installer -pkg ./python-3.12.2-macos11.pkg -target /

Either way, pdf2scanlist.py requires pdfreader

% pip3 install pdfreader

You will also need to build OGRE's internal python libraries

% cd [location]/OGRE-pipeline/lib/PY

% bash setup.sh

**Git:** % brew install git

**FSL:** <https://fsl.fmrib.ox.ac.uk/fsl/fslwiki/FslInstallation>

**Upgrade BASH (Mac only):** <https://itnext.io/upgrading-bash-on-macos-7138bd1066ba>

* The “vim” step is annoying but for basic vim navigation see <https://opensource.com/article/19/3/getting-started-vim> , Step 2
* Final step (chsh -s /opt/homebrew/bin/bash) may need to be completed by all users
* Alternatively, for users who wish to keep the native zsh

Create softlinks in /usr/local/bin

sudo ln -s /opt/homebrew/Cellar/bash/<version>/bin/bash /usr/local/bin

sudo ln -s /opt/homebrew/Cellar/bash/<version>/bin/bashbug /usr/local/bin

Ex. sudo ln -s /opt/homebrew/Cellar/bash/5.2.12/bin/bash /usr/local/bin

sudo ln -s /opt/homebrew/Cellar/bash/5.2.12/bin/bashbug /usr/local/bin

Usage: At the top of your bash scripts use the shebang

#!/usr/local/bin/bash

or

#!/usr/bin/env bash #this may or may not be equivalent to the above

**Freesurfer:** https://surfer.nmr.mgh.harvard.edu/fswiki//FS7\_mac

**Freesurfer is used by the pipeline. Versions 5.3.0-HCP, 7.2.0, 7.3.2, 7.4.0 and 7.4.1 have all been implemented in the pipeline.**

Download

% curl -O <freesurfer URL>

Ex. % https://surfer.nmr.mgh.harvard.edu/pub/dist/freesurfer/7.4.1/freesurfer-macOS-darwin\_x86\_64-7.4.1.tar.gz

Install

% sudo tar -C <where to install> -zxvpf <downloaded file>

Ex. % sudo mkdir -p /Applications/freesurfer # create folder if it doesn’t exist

% sudo tar -C /Applications/freesurfer -zxvpf freesurfer-macOS-darwin\_x86\_64-7.4.1.tar.gz

Rename so this version is not crushed by a future version.

% sudo mv /Applications/freesurfer/freesurfer /Applications/freesurfer/<version>

Ex. % sudo mv /Applications/freesurfer/freesurfer /Applications/freesurfer/7.4.1

License: <http://surfer.nmr.mgh.harvard.edu/registration.html>

% sudo mv license.txt /Applications/freesurfer/<version>

Ex. % sudo mv license.txt /Applications/freesurfer/7.4.1

**qt**

**qt is used by Tim Coalson’s CiftiLib which is used by in house software.**

Change permissions. This line of code was provided by brew itself after first attempting the install command.

sudo chown -R $(whoami) /opt/homebrew

Install

/opt/homebrew/bin/brew install qt<version>

Ex. /opt/homebrew/bin/brew install qt@5

**OpenMP**

**OpenMp is used by the pipeline and Tim Coalson’s CiftiLib which are used by in house software. Freesurfer also has OpenMP capability, so you might not need to install this separately.**

Install

/opt/homebrew/bin/brew install llvm

/opt/homebrew/bin/brew install libomp

**Boost**

**Boost is used by Tim Coalson’s CiftiLib which is used by OGRE.**

Install

/opt/homebrew/bin/brew install boost

**pkgconfig**

**pkgconfig is used by cmake and CiftiLib which are used by OGRE.**

Install

/opt/homebrew/bin/brew install pkg-config

**cmake**

**cmake is used to build Tim Coalson’s CiftiLib and also used to build OGRE.**

Install

/opt/homebrew/bin/brew install cmake

**pdfreader**

**pdfreader is used to by the (optional) "pdf2scanlist" tool that will read XNAT screenshots**

Install

pip3 install setuptools

If this doesn't work, try

pip3 install pdfreader --break-system-packages

**Connectome Workbench**

Included as part of the OGRE download, but may be independently acquired from <https://www.humanconnectome.org/software/get-connectome-workbench>

Troubleshooting: for some versions of Mac OS, you may need to permanently bypass security via the following process, for each wb\_XX file in the bin\_macos64X folder:

Double click it to open it. You will get an error message.

System Preferences > Security > General.

“Open Anyway” button. Confirm by hitting “open”

**dcm2niix**

**Converts dicom files to nifti format. Note that FSL includes dcm2niix in /usr/local/fsl/bin. You can check to see if it is the latest release.**

% /usr/local/fsl/bin/dcm2niix

Compare to <https://github.com/rordenlab/dcm2niix/releases> where you can also download the latest release if needed. Use the installer package.

**Update .bash\_profile/.zshrc**

There are a variety of ways to set up your environment. If you work within the bash shell, you may wish to add variables to your .bash\_profile. If instead you work within mac’s native z shell, you may wish to create a .zshrc. Here is a rough example of a.bash\_profile or .zshrc. Make sure to update the paths for your machine.

umask 002 #Folder permissions rwxrwxr-x

export FSLDIR=/usr/local/fsl #Set location of FSL

. ${FSLDIR}/etc/fslconf/fsl.sh #Set FSL environment including PATH

export OGREDIR=/Users/Shared/Documents/GitHub/OGRE-pipeline # OGRE folder

export PATH=$PATH:$HCPDIR #Add homebrew, pipeline and HCPDIR to PATH

Freesurfer variables may also be added:

export FREESURFDIR=/Applications/freesurfer #Set location of Freesurfer installations

export FREESURFVER=7.4.1 #Currently we are using Freesurfer 7.4.1

export FREESURFER\_HOME=$FREESURFDIR/$FREESURFVER #Set FREESURFER\_HOME

source $FREESURFER\_HOME/SetUpFreeSurfer.sh

PATH=$PATH:$FREESURFER\_HOME/bin #Add location of Freesurfer binaries to path

Variables set via the script options will override those made in the .bash\_profile or .zshrc.

If you are find that that FSL/FEAT runs very slowly on your mac due to the "film\_gls" process taking forever (this is true on our M2 but not our M1), add the following line to your .zshrc:

export OPENBLAS\_NUM\_THREADS=1

We recommend adding the following line to the BOTTOM of your profile. It will ensure that your system looks for scripts first in the homebrew & core installation directories. Without this, python calls may accidentally invoke FSL’s internal version of python instead of your system-wide version.

export PATH="/opt/homebrew/bin:/usr/local/bin:/usr/local/sbin:~/bin:/usr/bin:$PATH"