Open Speech Platform: Quick Start Guide

http://openspeechplatform.ucsd.edu

Release 2018c
June 19, 2019

Abstract

This document describes download, build, install and test steps for the Open Speech Platform (OSP) Release 2018c software. This work is supported by Nation Institute of Health, NIH/NIDCD grant R01DC015436, "A Real-time, Open, Portable, Extensible Speech Lab" to University of California, San Diego. Please visit OSP Forum - Getting Started to report bugs and suggest enhancements.

Contents

Chapter 1

Release 2018c Installation

1.0.1 System Requirements

In order to use OSP, you must use either a Mac or Linux machine with the system requirements depicted in the following images.

Figure 1.1: These are the system requirements if using a machine with the Mac operating system.

This section describes download, build and install steps for the realtime master hearing aid (RT-MHA) and the embedded web server (EWS). These two subsystems comprise OSP.

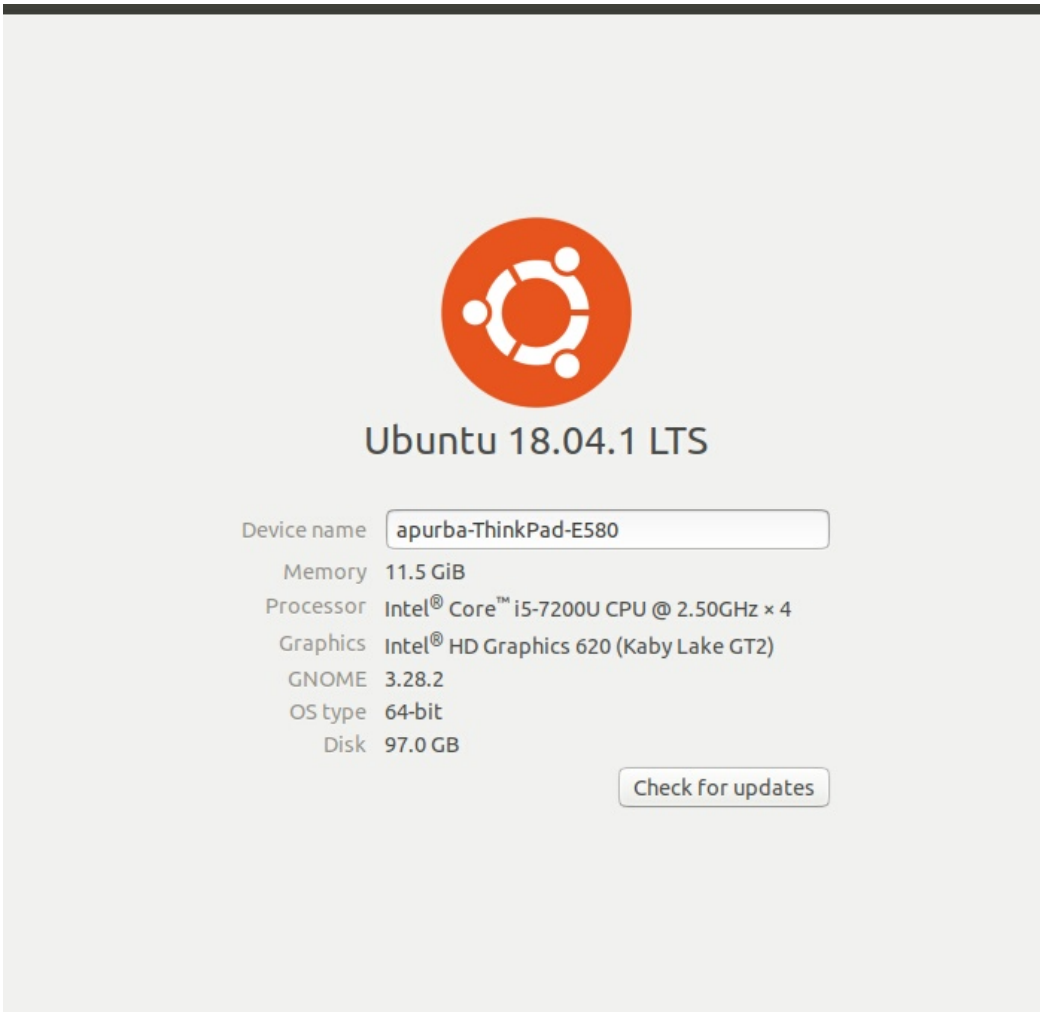

Figure 1.2: These are the system requirements if using a machine with the Linux operating system.

1. **Download 2018c**. Download the latest release from https://github.com/nihospr01/OpenSpeechPlatform-UCSD. You can either "clone the software on your computer" or "download ZIP file to your computer."

   (a) If you wish to clone, type `cd` in to your terminal, to make sure you are in the local directory. Then press clone in github, and copy the

line of code generated into your terminal. Once it has cloned, type `cd nameofdirectory` (for example cd OpenSpeechPlatform-UCSD). Then, type `git pull` to get the latest version. This is the preferred approach.

(b) When you download a .zip file from github, you will have to manually download newer versions with bug fixes.

2. **Install 2018c** Open a terminal. `cd ./Software/` and `./install`. This script does several things.

   (a) Identify the operating system (OS) on your computer – currently OS X and Linux.

   (b) Install software packages including portaudio (for realtime audio input/output); MySQL (a relational database), PHP (a server side scripting language) and other packages for LAMP software stack (LAMP stands for Linux, Apache, MySQL and PHP).

   (c) Build RT-MHA and EWS.

   (d) Finally, it installs osp in `/usr/local/bin/osp` and a script to invoke ews in `/usr/local/bin/ews`.

If everything went well, your screen will look similar to Figure 1.3.

```
HariDesktop-2:osp-2018c-release-staging harinath$ cd ./Software/
HariDesktop-2:Software harinath$ ls -l
total 32
drwxr-xr-x   9 harinath  staff   306 Dec 24 08:36 ./
drwxr-xr-x  11 harinath  staff   374 Dec 22 18:24 ../
-rw-r--r--@  1 harinath  staff  6148 Dec 22 19:13 .DS_Store
drwxr-xr-x   8 harinath  staff   272 Dec 24 08:38 .idea/
drwxr-xr-x  26 harinath  staff   884 Dec 22 18:26 EWS/
drwxr-xr-x  11 harinath  staff   374 Dec 22 19:17 OSP/
-rw-r--r--   1 harinath  staff    76 Dec 24 08:36 README.md
-rwxr-xr-x   1 harinath  staff  1681 Dec 22 18:24 install*
drwxr-xr-x  10 harinath  staff   340 Dec 22 19:17 libosp/
HariDesktop-2:Software harinath$ ./install

This script will use 'sudo' throughout at various times, invoke this
as a user with sudo privileges and enter your user password when
prompted

/usr/local/bin/brew
Install brew
==> This script will install:
/usr/local/bin/brew

[snip]

To run open two terminal windows, then in first one run 'osp' and in
the second run 'ews'.
Now open a browser window and go to http://localhost:8000
or type '-h' in the terminal running 'osp'.

HariDesktop-2:Software harinath$
```

Figure 1.3: Terminal output after the `./install` command. You will need to enter your password at various times. *snip* represents a large portion of the terminal output deleted in this figure. This process can take $30 - 90$ minutes, depending on your computer and network speed. The script ends with instructions on invoking osp and ews in the terminal.

Chapter 2

Release 2019a Test and Validation

This chapter describes sanity tests to validate your versions of `osp` and `ews`.

2.1 Connecting Audio I/O Devices

There are many audio input/output options for OSX and Linux computers. One inexpensive option is the Andrea Communications 3D Surround Sound Recording CANS. They are supra-aural headsets, with left and right mics.

You can also use a high end audio device such as Zoom TAC-8 or Focusrite Scarlett 2i2.

2.1.1 On OS X machines

1. Plug the headsets in to an available USB port.
2. On Mac computers, **Open Audio MIDI Setup**: This can be found in `Finder | Applications | Utilities`, as shown in Figures 2.1 and 2.2.
3. Select 48,000 Hz option on both screens and levels to 1..0 as shown.
4. If you use a high end audio interface box (such as Zoom TAC-8) and if you have 98,000 Hz and 24 bit option, you should choose this.

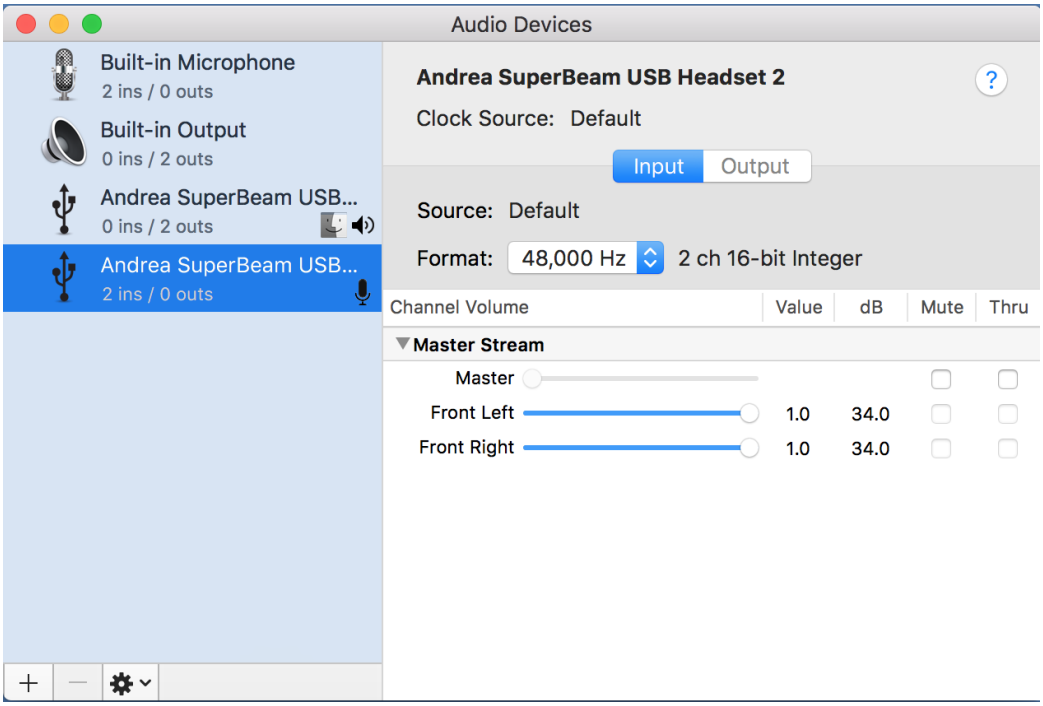

Figure 2.1: USB Audio Input Configuration.

2.1.2 On Linux machines

1. On Linux machines the default audio is not set. Run the command `pa_devs` to give the list of the available devices and the device numbers they correspond to

2. Run the command `osp --input_device x --output_device y`, where `x` and `y` are values attained from the previous command.
   With reference to Figure 2.3, the command issued is `osp --input_device 6 --output_device 6`

2.2 Test RT-MHA

You can interact with RT-MHA from command line interface (CLI) to display and change the HA state.

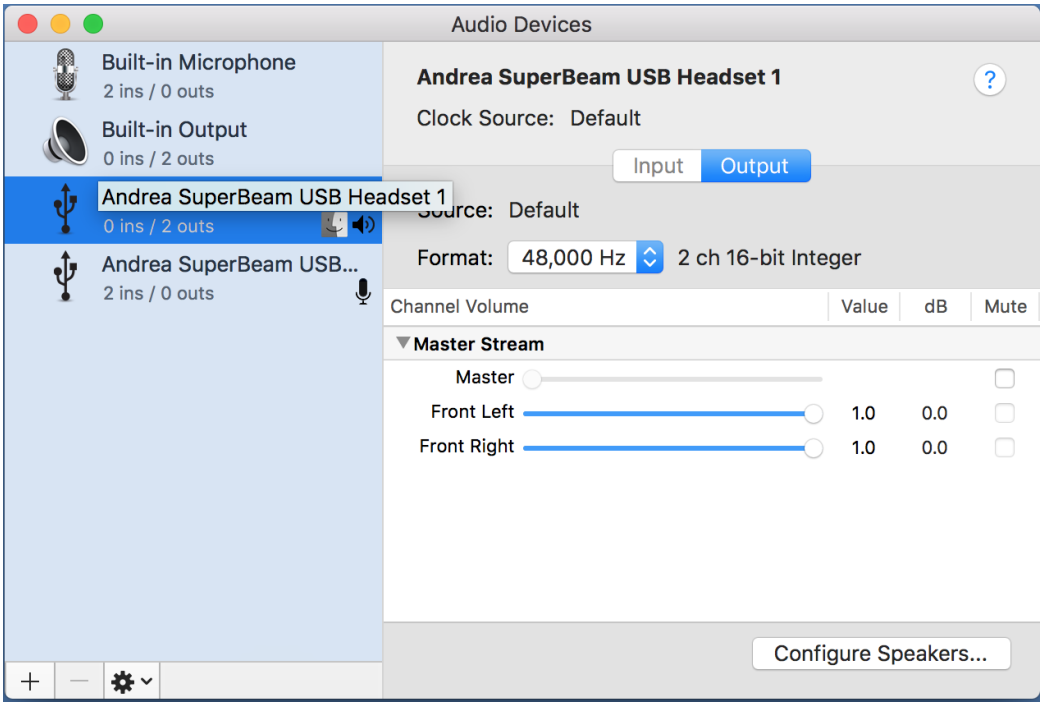

Figure 2.2: USB Audio Input Configuration.

1. Do not wear the headsets for now.
2. Open a terminal and issue `osp` command. The screen will show information similar to Figure 2.4.
3. `-h` will generate help output as shown in Figure 2.5.
4. `-p` will print the *complete state* of RT-MHA. Notice that the gain on the left and right channels is -20 dB, to account for overall gain of the system.
5. `-q` will exit RT-MHA.
6. `--gain -15` will make the system sound louder by 5 dB.
7. All the parameters in HA state can be changed with `--parameter value` in command in CLI.

```
Default low input latency   =  -1.0000
Default low output latency  =   0.0058
Default high input latency  =  -1.0000
Default high output latency =   0.0348
Default sample rate         = 44100.00
Supported standard sample rates
 for half-duplex 16 bit 8 channel output =
        32000.00, 44100.00, 48000.00, 88200.00,
        96000.00, 192000.00
------------------------------------ device #6
Name                        = Andrea SuperBeam USB Headset: Audio (hw:1,0)
Host API                    = ALSA
Max inputs = 0, Max outputs = 2
Default low input latency   =  -1.0000
Default low output latency  =   0.0087
Default high input latency  =  -1.0000
Default high output latency =   0.0348
Default sample rate         = 44100.00
Supported standard sample rates
 for half-duplex 16 bit 2 channel output =
        44100.00, 48000.00
------------------------------------ device #7
Name                        = sysdefault
Host API                    = ALSA
```

Figure 2.3: List of devices displayed by running the **pa_devs** command
Can we use white background in the terminal shots for the document? Black is good for code development, but I am not sure for documents

8. Make sure that the headsets did not go in to unstable operation so far. Then you can put the headsets on.

9. Repeat –**gain -15** command and listen to external audio stimuli.

10. Use -q to quit osp.

```
Garudadris-MacBook-Pro-6:~ hgarudadri$ osp
4 threads available
Done
Input device # 3.
    Name: Andrea SuperBeam USB Headset
      LL: 0.00458333 s
      HL: 0.0139167 s
Output device # 2.
   Name: Andrea SuperBeam USB Headset
     LL: 0.00335417 s
     HL: 0.0126875 s
Num channels = 2.
TCP Server created
```

Figure 2.4: Output of the terminal when you issue `osp` command. make sure to update this figure to latest 2018c release

```
-h
Welcome to the Open Speech Platform
Usage:
  osp [OPTION...]

 Control Signals options:
      --samp_freq arg      Set the sampling frequency for the mic and
                           reciever (default: 48000)
      --input_device arg   Please indicate which device you want to use
for
                           input
      --output_device arg  Please indicate which device you want to use
for
                           output
      --multi_thread arg   Please indicate if you want OSP to run in
multiple
                           threads
  -q, --quit               Quit OSP
  -p, --print              Prints out the current user data structure
  -h, --help               Prints out the help
```

Figure 2.5: High level commands for **osp** using the command line interface (CLI).

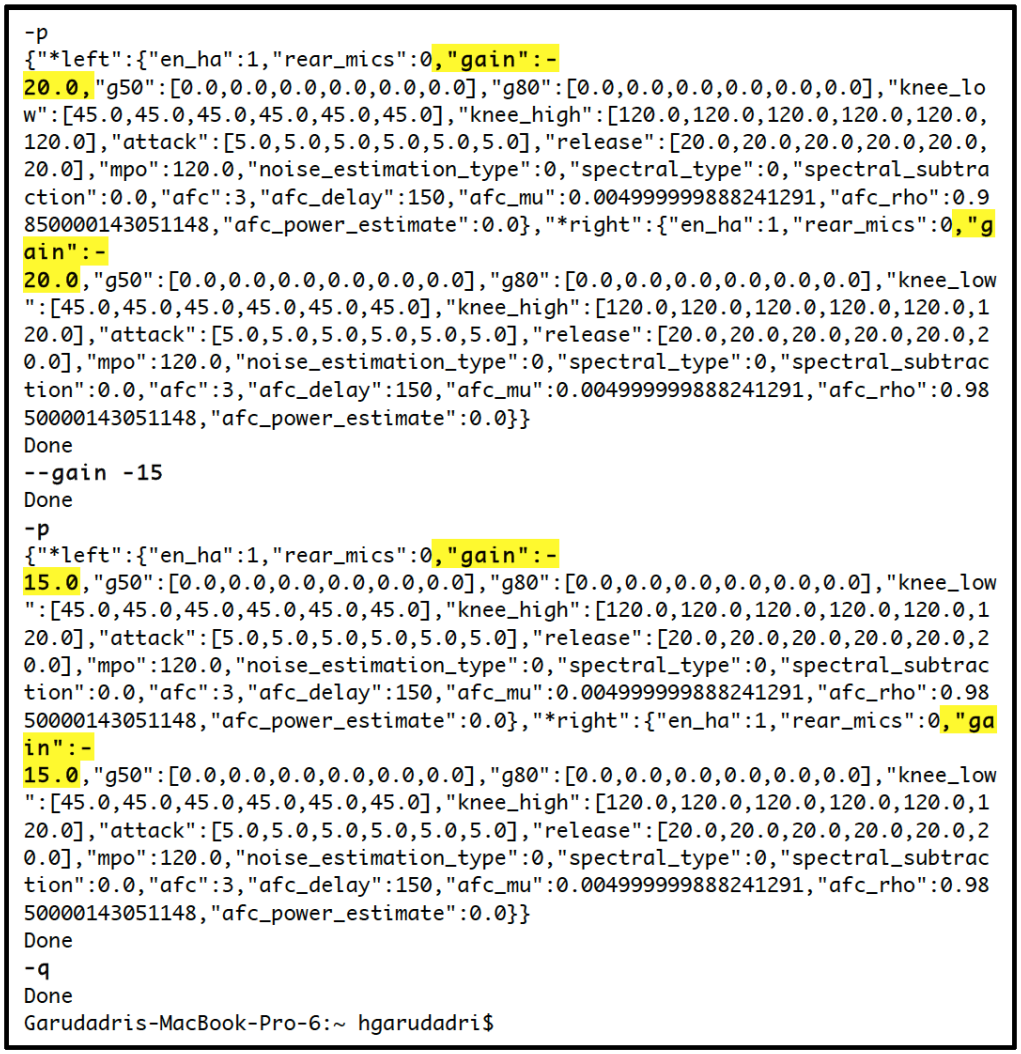

Figure 2.6: in the terminal.

2.3 Test EWS

For testing EWS, open two terminals side by side.

1. In the first terminal, type `osp`. In the second terminal, type `ews`.
2. Open a browser such as Chrome. Go to `http://localhost:8000` You will see the landing page as shown in Figure 2.7.

3. Click the Researcher Page. You will see the screen as shown in Figure 2.8.

4. Choose CR/G65 tab in the Amplification page. You can now change gains in individual bands by typing them in the G65 row.

5. In the (G65,All) cell, enter 5. The new values for RT-MHA will be highlighted. Press Transmit button and the state of RT-MHA will change to the new values. The highlighting will turn normal on changing the RT-MHA state successfully. Make sure that the headset is not whistling and then put it on. Your experience will be similar to that when you used –**gain -15** above.

6. In the OSP terminal, use **-p** and notice the values for overall gain (−20), CR (1) and G65 (5) for both left and right channels. CLI gain values are negative; EWS gain values are positive. We will confuse the users with thsi. We should harmonize these.

7. The Andrea headsets have additional low frequency gain. Depending the headsets you are using, your experience may be different. In the G65 row, for columns 250, 500 and 1000 Hz, enter −15, for a −15 dB attenuation. You will notice that the low frequency noise is significantly reduced.

8. Be sure to close both terminals when finished to make sure you don't get errors from trying ot run OSP or EWS twice.

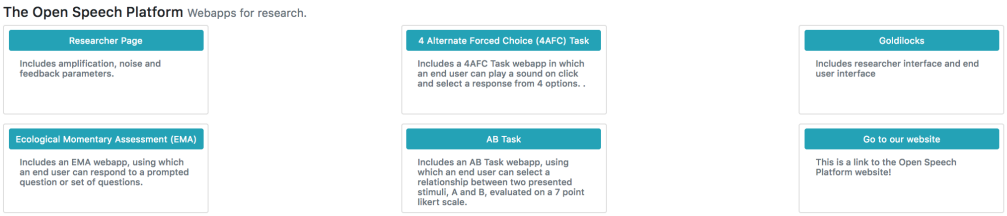

Figure 2.7: OSP Landing Page. Some of the apps are not yet connected to RT-MHA, but included here for early feedback on the user interface. These in progress web-apps are 4AFC and AB Task apps.

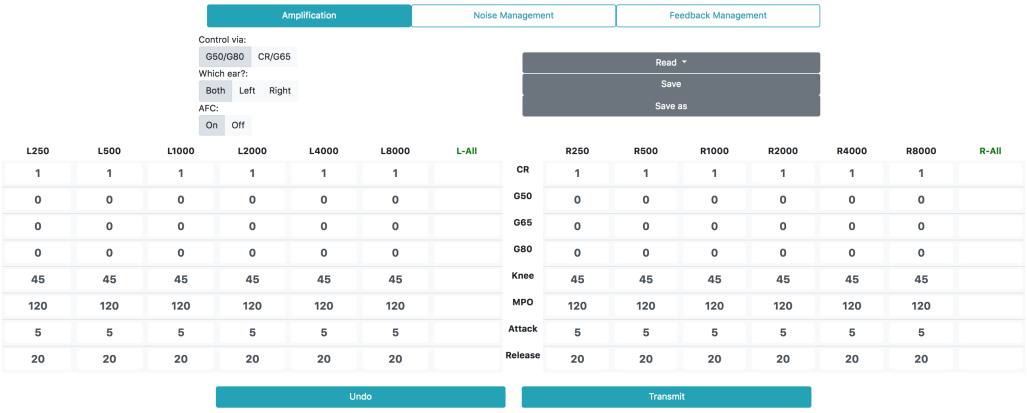

Figure 2.8: OSP Researcher Page. You can change Amplification, Noise Management and Feedback Management values from the first, second and third tabs, respectively.

Figure 2.9: OSP Web Apps in Console Mode. If you are using a browser such as Chrome, you can right click in the browser window and choose Inspect. In this mode, you can view exchange of information between RT-MHA and the app. You can also change the app to be formatted for laptop and mobile devices using the Toggle Device Toolbar.

2.4 New in 2019A- Verify File I/O is working

File Input and Output (I/O) allows users to input and output files directly to the MHA. This enables the use of pre-existing stimuli, and the ability to export audio recordings taken during the EMA webapp.

1. In the first terminal, type `osp`. In the second terminal, type `ews`.

2. Open a browser such as Chrome. Go to `http://localhost:8000` You will see the landing page.

3. Click on Ecological Momentary Assessment (EMA), enter your credentials and login. As soon as you press login, the OSP will record the "before" file.

4. Make conversation or play to provide some background noise that will be recorded. These files are recorded in 60 second intervals, so if you take 3 minutes, you will generate 3 files

5. One you are done with the final question, the system will record one final file, labeled "after"

6. If File I/O worked properly, the terminal in which you are running OSP should look like this image 2.10

7. To test that the files were in fact recorded, first locate the files. In the OSP terminal example in figure 2.10, notice the "audio-recordfile": "T5ORMQsyhE.wav" . The marker for this session is T5ORMQsyhE.wav, and all of the generated files will be labeled using this marker. The before file will be called T5ORMQsyhE-before.wav, the during files would be called T5ORMQsyhE-1,2, 3, etc. The after file is called T5ORMQsyhE-after.wav. This sequence of numbers and letters will change, but all the files from one session will be marked with the same label.

8. Go to Finder, and press "command+shift+g". Then, click on the folder public, and then click on the folder record. Now you should see a list of output files. Notice the 'T5ORMQsyhE' session files in figure 2.11

9. Simply double click on a file to open it with your default sound player. You can also right-click, and choose a specific player software. Listen

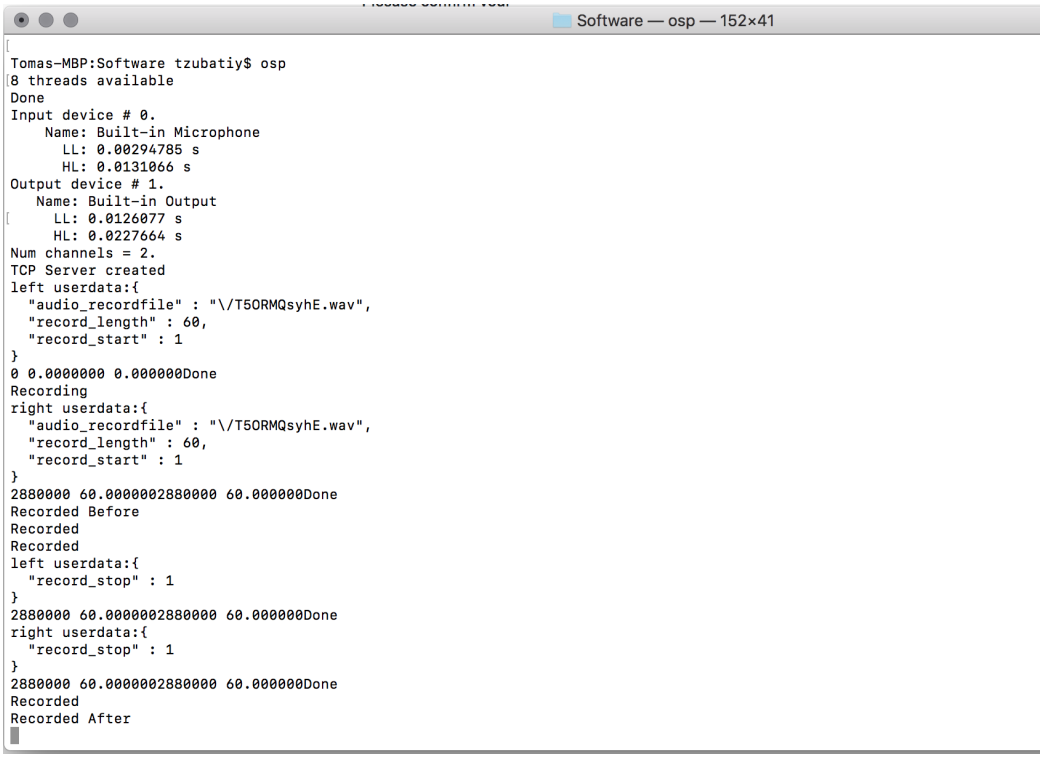

Figure 2.10: This is the terminal output. Please note the lines that say Recorded Before, then Recorded, Recorded, Recorded, and lastly Recorded After.

to the recordings, and make sure that the sound was recorded. Once you hear the sound coming out, you know the File I/O is working.

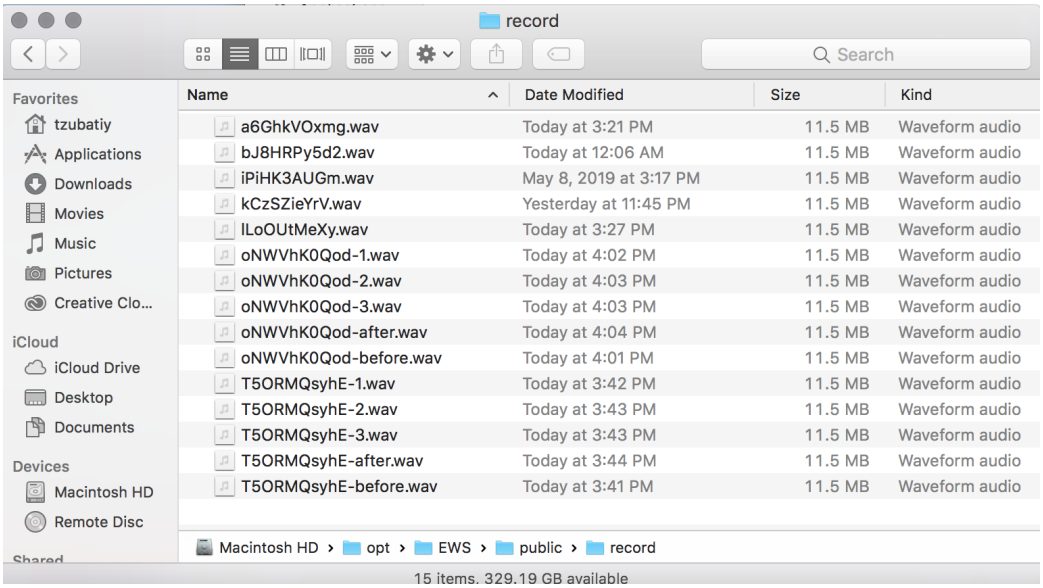

Figure 2.11: This is a view of the Finder, showing the contents of the record folder, which you access using step 8.