

21M.380 · MUSIC AND TECHNOLOGY RECORDING TECHNIQUES & AUDIO PRODUCTION

SOUND EDITING EXERCISE 4 (ED4) PREPARING STEMS

DUE: WEDNESDAY, NOVEMBER 2, 2016, 9:30AM
SUBMIT TO: ATHENA COURSE LOCKER
5% OF TOTAL GRADE

1 Context

After a recording session has been completed, the recorded instruments or instrument groups are usually first processed individually in preparation of the actual mixdown. For larger projects, so-called *stems* are often created to reduce the mixdown's complexity.¹ Each stem represents a submix of all the tracks that have been recorded for a given instrument or instrument group. For example:

¹ Cf., Senior 2011, pp. 76 f.

- A stereo (i.e., two-channel) stem for a drumkit that has originally been recorded on seven tracks: two mics for the kick drum (inside and outside), two for the snare (top and bottom), one for the hi-hat, and two for the overheads (toms and cymbals)
- A mono (i.e., one-channel) stem for an electric bass that has been recorded through a DI box and through a mic on the amp
- A mono stem for the lead guitar that has been recorded with only one mic, but requires compression and EQing
- A stereo stem for background vocals, for which multiple takes have been sequentially recorded at harmonizing melodies

The rationale is that it is easier to mix a handful of stems than dozens of individual tracks. While preparing the stems, one can focus on details concerning the respective instrument or instrument section, which one then does not need to worry about during the mix.

2 Instructions

Create stems from the tracks provided for an excerpt from a multi-track recording session.

1. Listen to the previews of the songs listed below and choose one that you want to work on. Consider that the productions are listed in increasing complexity, so pick one that reflects your ambition and ability.
2. Download the .zip archive for your favorite song, which contains the individual tracks in .wav format.
3. Prepare the stems requested for that song in your DAW

In an accompanying write-up, describe separately for each stem which problems you faced and how you have addressed them.

3 Guidelines

3.1 Source materials

The audio files required for this assignment are provided for educational purposes² through Mike Senior's Multitrack Download Library.³

3.1.1 Option 1: Banned From The Zoo – *Turn on Me*

- Preview:
http://www.previews.cambridge-mt.com/TurnOnMe_Preview.mp3
- Source material (88MB): http://www.multitracks.cambridge-mt.com/BannedFromTheZoo_TurnOnMe.zip

You are expected to create and submit the following 4 audio files:

- 1_drums.flac: Stereo stem from tracks Nos 1–10 (drums)
- 2_bass.flac: Mono stem from tracks Nos 11+12 (bass)
- 3_guitar_ukulele.flac: Stereo stem from tracks Nos 13+14 (electric guitar and ukulele)
- 4_vocals_lead.flac: Mono stem from track No15 (lead vocals)

3.1.2 Option 2: Tom McKenzie – *Directions*

- Preview:
http://www.previews.cambridge-mt.com/1304_Preview.mp3
- Source material (61MB): http://www.multitracks.cambridge-mt.com/MR1304_TomMcKenzie.zip

² <http://www.cambridge-mt.com/ms-mtk-UsageFAQs.htm>

³ If you get an error message in your browser when trying to download any of the files from cambridge-mt.com, reloading the page should resolve the problem.

You are expected to create and submit the following 6 audio files:

- 1_drums.flac: Stereo stem from tracks Nos 1–8 (drums and percussion)
- 2_bass.flac: Mono stem from tracks Nos 9+10 (bass)
- 3_guitar_ac.flac: Mono stem from tracks Nos 11+12 (acoustic guitar)
- 4_guitar_el.flac: Stereo stem from tracks Nos 13–15 (electric guitars)
- 5_vocals_lead.flac: Mono stem from track No16 (lead vocals)
- 6_vocals_back.flac: Stereo stem from tracks Nos 17–26 (background vocals)

3.1.3 Option 3: Fergessen – *Back from The Start*

- Preview: http://www.previews.cambridge-mt.com/BackFromTheStart_Preview.mp3
- Source material (43MB): http://www.multitracks.cambridge-mt.com/Fergessen_BackFromTheStart.zip

You are expected to create and submit the following 8 audio files:

- 1_drums.flac: Stereo stem from tracks Nos 1–9 (drums)
- 2_percussion.flac: Stereo stem from tracks Nos 10+11 (percussion)
- 3_bass.flac: Mono stem from track No12 (bass)
- 4_rhodes.flac: Mono stem from track No13 (rhodes)
- 5_guitar_el.flac: Stereo stem from tracks Nos 14+15 (electric guitar)
- 6_guitar_ac.flac: Mono stem from track No16 (acoustic guitar)
- 7_vocals_lead.flac: Mono stem from track No17 (lead vocals)
- 8_vocals_back.flac: Stereo stem from tracks Nos 18–23 (background vocals)

3.2 Software recommendations

As for previous assignments you should use Reaper, or whichever other DAW package you might have agreed on with the instructor. No plugins will be required beyond those already used for the ED2 and ED3 assignments, so you can stick to those.

3.3 In which order should I prepare the stems?

It is quite common to prepare the stems for the rhythm section first and gradually proceed towards the lead instruments. For example:

1. Drums
2. Bass
3. Rhythm guitar
4. Lead guitar
5. Vocals

3.4 What kind of audio processing should I use?

The creation of a stem typically involves the following steps.

- Selecting suitable tracks for the given instrument or instrument group. Not every mic might turn out to be useful, and *you are not required to use every track available for a given stem*.
- The use of a *compressor* to increase the instrument's fader stability, definition, and presence.
- The use of an *equalizer* (EQ) to remove unwanted frequency content (e.g., amp noise, leakage from other instruments) and shape the instrument's timbre according to personal taste and the demands of the mix (e.g., spectral separation).⁴
- *Mixing* the selected tracks at an appropriate level balance. For example, mixing the top and bottom mics of a snare drum will affect its overall timbre, so you need to decide what kind of sound you want!
- In the case of stereo stems (for larger instruments or instrument sections), the use of a *panpot* and/or *balance control* to adjust the stereo image. Do not submit stereo stems with two identical channels; instead, you should make use of the possibilities that stereo affords you where a stereo stem is requested.

⁴ Consult the ED3 assignment instructions for suggestions regarding the order of EQ and compressor plugins.

Limit your efforts to these and resist the temptation to use any additional audio effects. You will get a chance to experiment with reverbs, flangers, phasers, and other effects for the upcoming mixing assignments. In particular, you should refrain from adding any effects to the stereo output bus, and if you use your DAW's stem rendering feature (see below), you should even refrain from touching the master stereo output fader (whose setting would be ignored).

3.5 Recommended DAW workflow

No matter which of the three songs you choose, some stems will always have to be created from multiple input tracks, which requires these input tracks to be mixed before rendering. This means that if your DAW allows you to render each input track to a separate file, that is *not* the best strategy for rendering this assignment. Instead, set up a dedicated DAW session for each stem that you need to create and import all the source files for that stem into the session as separate input tracks.

3.5.1 Rendering the results

When you are done, render the DAW's master output:

- Reaper: File >> Render >> Master mix
- Ardour: Session >> Export >> Export To Audio File(s) ...
- Logic: File >> Bounce >> Project or Section...

A challenge that you will face is how to render to mono, since the master output of your DAW is stereo by default. The following options will be useful for a workaround:

- Reaper: File >> Render >> Options >> Channels
- Ardour: Session >> Export >> Export To Audio File(s) ... >> Channels >> Channels

3.5.2 Target format and file names

Please render your files according to the following specifications:

- .flac file format
- Sample rate and bit depth must correspond to the original source file(s), i.e., 44.1 kHz and 24 bit
- Channel number must be 1 for mono stems and 2 for stereo stems

- Please stick meticulously to the file names listed in section 3.1, including numeric prefixes, underscores, and the exclusive use of non-capital letters.

3.6 Accompanying write-up

The purpose of the write-up is for me to have something to refer to whenever questions arise regarding the editing decisions you have made. Keep this document very concise (2–3 pages max.) and informative, and do not make it too verbose. This should really be an editing, not a writing assignment.

Your writeup should include a legible representation of your basic mix settings, including fader levels in dB, meaningfully quantified panpot positions,⁵ and which plugins that were used on each track. These settings can either be provided in tabular form or – preferably – as a (series of) legible screenshot(s) embedded into your document. In addition, a screenshot of your entire project’s main editing window should provide a rough overview of any automation envelopes that you have applied. Make sure all tracks, curves, and parts of your project are visible.

⁵ Panpot positions are measured differently in different software packages. Provide them in a format that can be interpreted, such as “60% L”, or “9 o’clock R” etc. Do not provide meaningless numbers that neither carry a unit, nor refer to any scale maximum. Better yet is to provide screenshots.

4 Assessment criteria

4.1 Successful application of editing techniques

The stems that you submit need to demonstrate your familiarity with the following studio techniques.

- Using a compressor
- Using an equalizer (EQ)
- Using a panpot (only applies to stereo stems)
- Mixing and rendering mono and stereo stems correctly
- Rendering .flac files

Any good production practices that we have discussed at earlier occasions continue to apply, such as bouncing your stems to an appropriate overall level and submitting them in the correct file format.

4.2 Correct application of rendering

You are expected to double-check the rendered files before you submit them – do not just assume that things worked as you expected! Besides checking the files for correct sample rate and bit depth, you should make sure that all stereo stems have actually been rendered as stereo files, and all mono stems as mono files. Also, confirm *by ear* that each stem contains a signal composed of the correct sources in the expected balance and with the expected processing (EQ, compression) applied. As for previous assignments, you should also ensure that each submitted audio file has the same duration as the original source file(s); avoid mysterious silence at the end of a file. Do all these checks by importing your rendered stems into a new DAW session.

4.3 Usability of stems in a mixdown context

Importing your stems into a new DAW session will also allow you to get a sense for how they will sound in the context of a mixdown. Although you are not expected to submit an actual mix at this occasion (this will be the subject of our upcoming MX1 assignment), previewing your stems in this manner should be very informative also for this assignment. As you prepare your stems, occasionally render drafts and check how well they blend in an ad-hoc mix in a separate DAW session.

5 Submission format

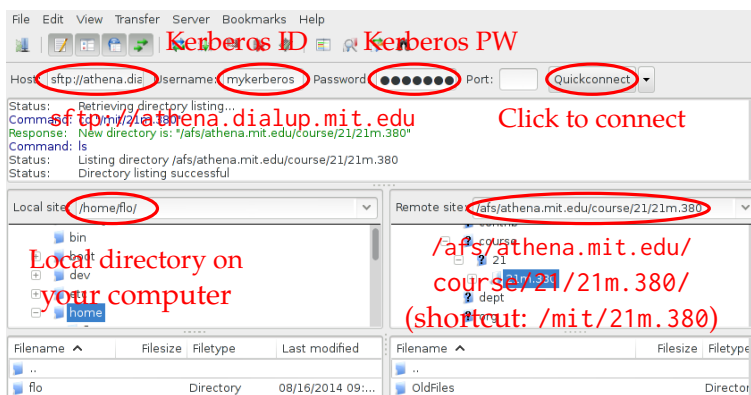


FIGURE 1. Course locker access via Filezilla (free for Mac, Win, Linux)

This is the first assignment to be submitted via the Athena Course Locker rather than via Stellar. Test this process with some dummy

file well before the submission deadline and let me know if you run into trouble.

1. Download an FTP client such as the free and cross-platform *Filezilla*.⁶
2. Figure 1 shows how to connect to the course locker via Filezilla.
3. Drag-and-drop your files from your local drive to the following directory on the server: `afs ▶ athena.mit.edu ▶ course ▶ 21 ▶ 21m.380 ▶ ed4 ▶ YOUR-KERBEROS-ID` where YOUR-KERBEROS-ID should be replaced with exactly that. Please do *not* delete the `.htaccess.mit` file in this directory.

⁶ https://filezilla-project.org/download.php?show_all=1

Please do *not* pack your submission into a `.zip` or other archive format at this occasion. Instead, upload your audio files and write-up as individual files, which should be named as follows, depending on which song you decided to work on.

5.1 Banned from the Zoo - *Turn on Me*

`afs ▶ athena.mit.edu ▶ course ▶ 21 ▶ 21m.380 ▶ ed4 ▶ YOUR-KERBEROS-ID`

- writeup.pdf (2–3 pages)
- 1_drums.flac (stereo, 44.1 kHz, 24 bit)
- 2_bass.flac (mono, 44.1 kHz, 24 bit)
- 3_guitar_ukulele.flac (stereo, 44.1 kHz, 24 bit)
- 4_vocals_lead.flac (mono, 44.1 kHz, 24 bit)

5.2 Tom McKenzie – *Directions*

afs ▶ athena.mit.edu ▶ course ▶ 21 ▶ 21m.380 ▶ ed4 ▶ YOUR-KERBEROS-ID

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- 1_drums.flac (stereo, 44.1 kHz, 24 bit)
- 2_bass.flac (mono, 44.1 kHz, 24 bit)
- 3_guitar_ac.flac (mono, 44.1 kHz, 24 bit)
- 4_guitar_el.flac (stereo, 44.1 kHz, 24 bit)
- 5_vocals_lead.flac (mono, 44.1 kHz, 24 bit)
- 6_vocals_back.flac (stereo, 44.1 kHz, 24 bit)

5.3 Fergessen – *Back from The Start*

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- 3_bass.flac (mono, 44.1 kHz, 24 bit)
- 4_rhodes.flac (mono, 44.1 kHz, 24 bit)
- 5_guitar_el.flac (stereo, 44.1 kHz, 24 bit)
- 6_guitar_ac.flac (mono, 44.1 kHz, 24 bit)
- 7_vocals_lead.flac (mono, 44.1 kHz, 24 bit)
- 8_vocals_back.flac (stereo, 44.1 kHz, 24 bit)

References & useful resources

Senior, Mike (2011). "From Subjective Impressions to Objective Results." In: *Mixing Secrets for the Small Studio*. 1st ed. Focal Press. Chap. 4, pp. 57–77. ISBN: 978-0240815800. MIT LIBRARY: 002092991. Electronic resource. Accompanying information and sound examples: <http://www.cambridge-mt.com/ms-ch4.htm>.

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