Final Project – Your Own Musical Composition

Introduction to Digital Sound and Music

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In the following write up, I detail creating a short, simple song and producing it in a multitrack version in Waveform. The ultimate goal is to create a song in the key of C on the major diatonic scale by building a multitrack with at least one melody, harmony, drum/bass, and recording track.

Tempo and Meter

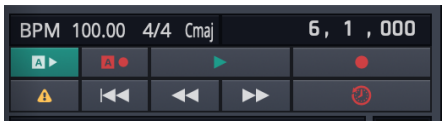
My song is 4/4 TIME: the number on top shows that each measure gets four beats; the figure on the bottom shows that a quarter note gets one beat. I set the song's tempo, in beats per minute, to **100 bpm**. My goal for the pace is always between 100 and 130 bpm because if the bpm were too high, the music would play too fast and sound jarring, and if the bpm were too low, the music would play too slow and sound lethargic. The sampling rate for the digital audio is 44100 samples/second (standard sampling rate). The rhythm repeats a simple percussive drum beat pattern in the background of the entire song.

Given 4/4 TIME, AND SET TEMPO AT 100 BPM, the following tables detail the calculations that show the songs time length $\approx$ 1 minute + 17 seconds

abbreviation	full_name	measuring	value
q	quarter note	the note's beat	1 beat
m	measure	total number of bars	32 bars
qm	beats per measure	number of beats in a measure	4 beats per measure

Analysis	Units	Calculation	Work	Value
Tempo	bpm	GIVEN	GIVEN	100 bpm
Total Beats	beats	$\sum_{i=1}^{b} q(m_i) = \sum_{i=1}^{32} 4$	**4 beats** $\times$ **32 bars**	128 beats
Time	minutes	$\frac{beats}{\frac{beats}{minute}}$	$\frac{\textbf{128 beats}}{\textbf{100 bpm}}$	1.28 minutes
	sec	$\frac{beats}{\frac{beats}{min} \times \frac{min}{60sec}}$	$\frac{60 \times \textbf{128 beats}}{\textbf{100 bpm}}$	76.8 seconds

In standard AABA form, the song is a total of 32 bars long. Using *Waveform's TimeBar* at the top of the project menu, I ensure each track started at bar 1 and ended on bar 32. When organizing my song in AABA form, it was helpful to listen and read music with AABA form, such as the Christmas carol "Deck the Halls" as shown below.



(a) Setting meter, tempo, and rhythm in Waveform

A: Deck the halls with boughs of holly, fa la la la la la la la la.
A: Tis the season to be jolly, fa la la la la la la la la.
B. Don we now our gay apparel, fa la la la la la la la la.
A: Troll the ancient yuletide carol, fa la la la la la la la la.

(b) Deck the Halls in AABA form

(c) 32 bars of A A B A form

Figure 1: Setting up Tempo, Meter, and Form

Melody and Phrasing

My song has two melody tracks using Collective plugin instruments: the E. Bass Fngr Bassman and the Jazz Grand Piano. I chose to have two melody tracks because I like the sound of various instruments played together. As shown in **figure 2a**, the melody is in four-bar units, where two tracks either play together or alternate every four measures. The order of the notes is the same, but the instruments that play the notes are different.

In the key of C on the diatonic scale, the **tonic is C, supertonic is D, and leading tone is B**. My melody repeats movement amongst these TENDENCY TONES to create the sound's natural tension and release. Correspondingly, the tune ends with a movement according to the **tonality** to provide a natural stopping point.

CLASSIC TONALITY

EACH 4-BAR UNIT...

```
i. starts on tonic C,
ii. progressively moves away from the tonic,
iii. reaches the leading note B,
iv. and ends back at the tonic
```

MELODIC RESOLUTION

MELODY TRACKS FINISH WITH...

```
i. the leading tone B,
ii. moving to the supertonic D,
iii. and ending on the tonic C
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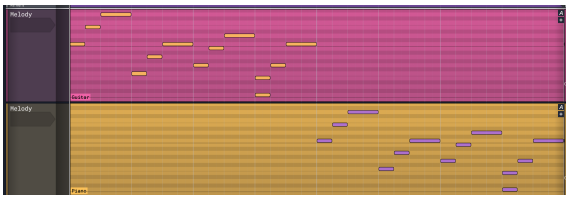
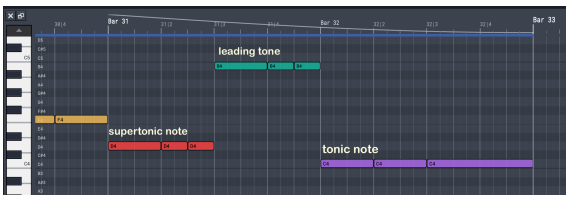


(a) Melody Four Bar Sequence

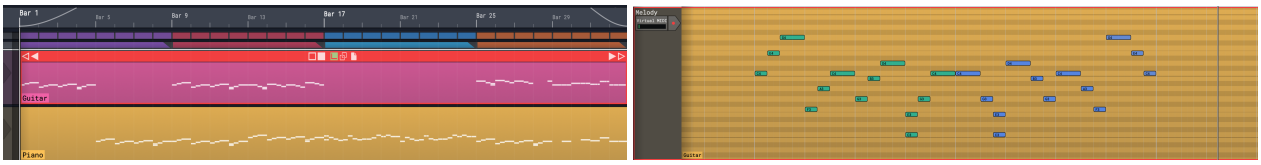


(b) Melodic Resolution

Figure 2: Movement of Tendency Tones

As the song progresses, the four-bar melody sequence will change its pitch, either higher or lower. **Figure 3a** illustrates the change in a shift as the song progresses through its full 32 bars. These shifts give the melody disjunctive movement of great distance to grab the listener's attention.

I use a TRANSITION RETROGRADE to apply melody variations to the song, where the ascending notes play in reverse order. Looking at **figure 3b**, we can see the transformation in the two measures that look like mirror images of each other.



(a) All 32 Bars of Melody (b) Retrograde Melody Variation

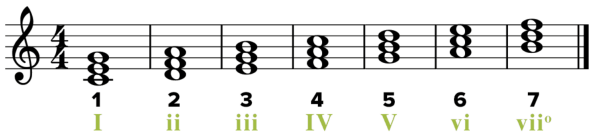
Figure 3: Melody Contour and Transformations

Given AABA FORMAT, you can see that the melody's B section is much different from the A section. This difference we see and hear by section B's piano track that plays a melody notably different from the rest of the song's melody.

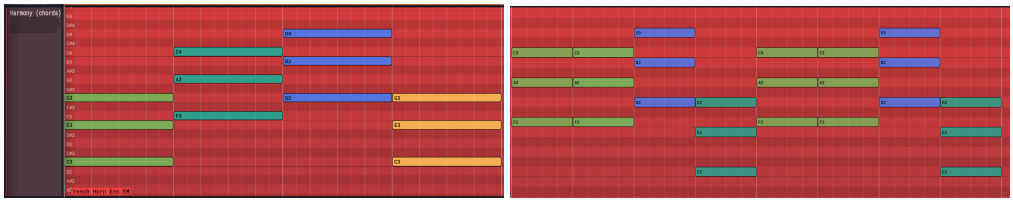
Harmony, choosing the basic chord sequence

Next is the song's harmony, which complements the melody in the form of chord progressions. Chords are typically 4-beats for this song. Two harmony tracks use Collective plugin instruments: the Classical Strings WMF, and French Horn Ens EM. Similar to the melody, the two tracks have the same note patterns, but different instruments while alternating every other 4-measures. I chose classical strings and brass instruments because they can produce smooth and long-sustaining chords, which, respectively, complement the guitar melody and piano melody.

For the song's AABA FORM IN THE KEY OF C, the table below outlines the main chord progression, I IV V I, in section A and the starting chord, IV, in section B. We also see a figure representing C Major scale building triads on each scale degree.



Section	Num	I	IV	V	I.
A	Chord	C major	F major	G major	C major
	Notes	CEG	FAC	GBD	CEG
B	Chord		F major		
	Notes		FAC		



(a) A chord I IV V I (b) B chord start with IV

Figure 4: Harmony track using Classical Strings and French Horn

We can distinguish the Harmony vertically on a musical score since the notes stack on top of each other to play at once. In terms of functional harmony, each chord sequence in the key of C has a similar pattern that MOVES AWAY FROM THE TONIC, CREATES MUSICAL TENSION, AND RETURNS TO THE TONIC

Percussive and Recorded Audio Tracks

Drum Track

Next is the song's Drum track in track 5, which uses the `FM Synth Log Drum` to create a constant percussion. **Figure 5a** below illustrates the drum's pattern that starts on C, then moves to notes G, then A, and ends on F.

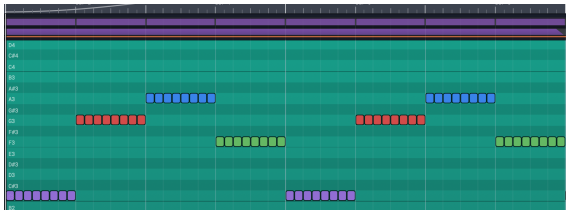
The 4-note pattern repeats every 4 measures.

```
Each note is a whole note getting 4 beats,
so each repetition has 16 beats.

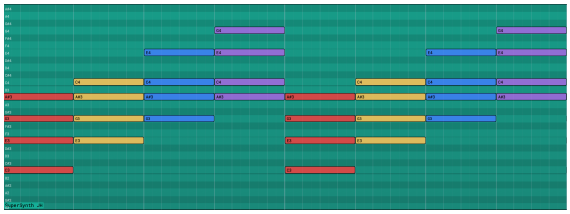
Since the song has 32 measures,
there are 8 repetitions of drums,
which adds up to the total of 128 beats.
```

SuperSynth Track

Next, the bass track uses the Subtractive SuperSynth JH. The purpose of this track is to experiment with the **dominant seventh chords**, which are the most common in jazz and blues music. *The song incorporates a very settle harmony using the chord progression.*



(a) Drum Track pattern



(b) Synth Dominant 7th Chord

(c) Patterns repeat for entire 32 bars

Figure 5: Simple Percussive Patterns

Recorded Audio Track

The next track is the recorded audio, which uses ambient sounds and effects. Covering at least two measures, I place the recorded audio in section B to compliment the song's contrasting form.

Figure 6: Recorded Audio spans two measures

Effects: Applying plugins to individual tracks

For sound effects, I add the CHORUS, COMPRESSOR/LIMITER, AND THE PHASER plugins into 3 tracks.

The CHORUS PLUGIN is working in conjunction with the guitar melody track (track 1).

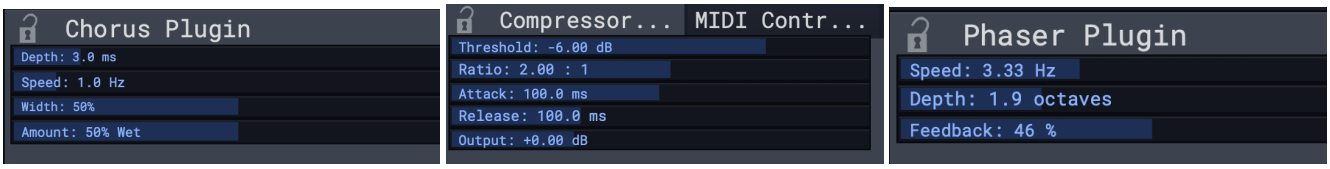
- Chorus plugins improve the soundtrack by making a single guitar sound like a lot of guitar performances.

The COMPRESSOR PLUGIN works with the strings harmony track (track 3).

- The compressor plugin enhances the track's balance and dynamics by reducing the sound's range between the loudest and quietest notes.

The PHASER PLUGIN is working in conjunction with the drum track (track 5).

- The phaser plugin enhances the track's beat by combining phase-shifted signals, which control under low-frequency oscillators, with the drum's original signal. In fact, the beat has a more pleasing sound, corresponding to the main melody.



(a) Chorus added to track 1 (b) Compresser added to track 3 (c) Phaser added to track 5

Figure 7: Effects made using various plugins

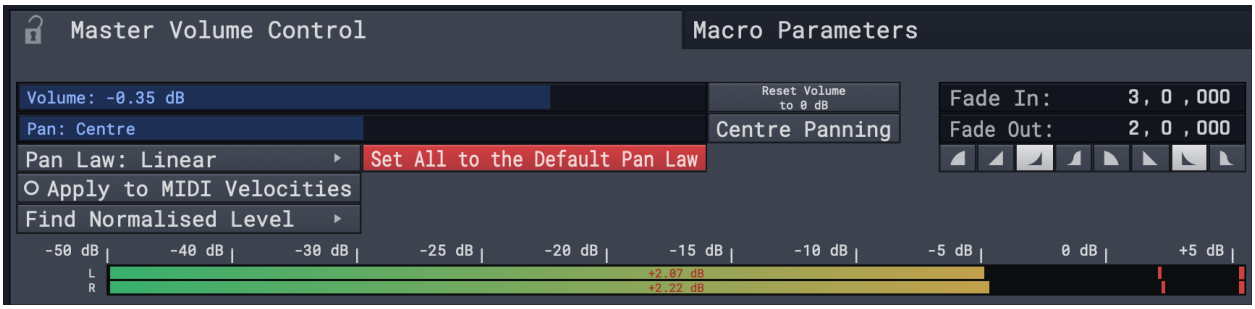
Mixing

The last step involves mixing the entire song into a single file. After creating the final mix, I applied the REVERB PLUGIN to all the tracks that passed through the main track. Reverberation is the effect of sound echoing in space. Adding dimensions and panning to improve my song, I tried and adjusted the level of reverb and reverb quick control parameters. Overall, the aux track for REVERBERATION adds more layers of mixing and dimensions to make the sound echo different and balance the amplitude to create a sound space.

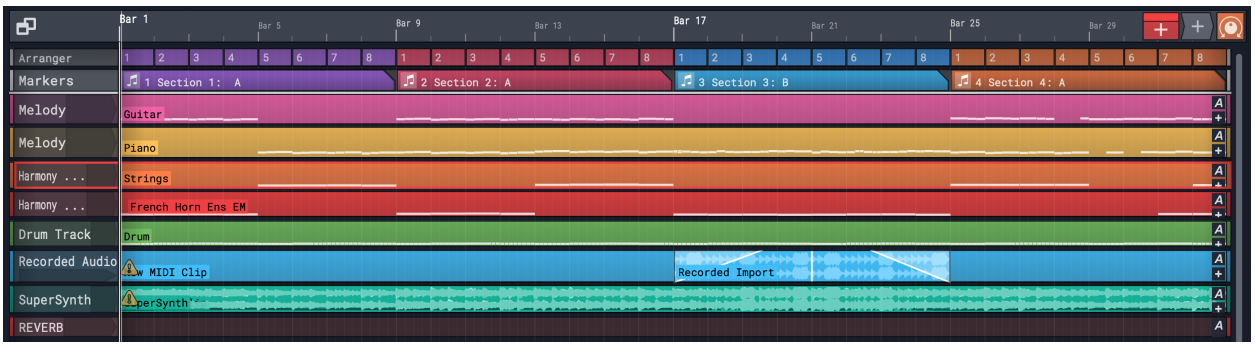
(a) Creating Aux Track for reverb space (b) Interface of Waveform's reverb plugin

Figure 8: Aux Track with Reverb plugin

I added the MASTER FADE INS AND OUTS for all of my tracks. In order to ensure that the tonic notes at the beginning and the end are audible, I keep the fade-in and fade-out time at about 3 seconds. I mix the final mixdown into a **wav file**, also called rendering. The wav file ensures that the final mix is uncompressed without degrading the audio quality. In my submission, the title of the wav file is FINALPROJECTLUEBBERING.WAV.



(a) Master Volume Fade Ins and Outs



(b) Full Multitrack view of complete song!

Figure 9: Final Mixdown