Music Production Using Virtual Orchestra: A Case of The Lost Tales Symphony

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Abstract

The Lost Tales Symphony was originally composed for a doctoral dissertation as The Lost Tales, Film Music for Symphony Orchestra. There are 9 episodic movements in which each movement represents different themes in terms of mood, tone, and feel. The piece has been re-arranged, re-orchestrated, and produced as a studio album using virtual orchestra from EastWest Quantum Leap Hollywood Orchestra Gold Edition. The objectives of the study are to find a way to produce an album with virtual instruments, to explore tools and techniques to make the sounds realistic and to present the methodology as an academic work. The summaries of the study include an album is produced with virtual instruments along with tools and techniques for effective MIDI sequencing through the usage of multiple audio effects. The three production stages, pre-production, production, and post-production, are covered in detail. In the end, the software is a tool, which cannot be perfect without the touch of the musician. The musician who can perform three roles as writer, producer, and engineer can be in an advantageous position than others.

Keywords: *music production, virtual orchestra, music technology, MIDI sequencing, virtual instrument*

1. Introduction

The Lost Tales Symphony was composed as film music for symphony orchestra. It was composed as the author's doctoral thesis. The piece comprises 9 episodic movements. Each movement represents different themes such as places, times, events, and characters. The piece had a world premiere at Music Hall, Art and Culture Building, Chulalongkorn University, Thailand on June 28, 2017.

There were many technical problems during a live performance in which the live recording cannot be released due to flaws such as the tempo was not stable, the sound of the keyboard was distorted, or some notes were played wrongly. The piece was re-arranged and re-orchestrated to record and produce as a studio album using a virtual orchestra. Arrangement and orchestration for virtual orchestra require a different approach from a live symphony orchestra, as it does not need to limit the number of instruments nor considering the breath mark of some certain instruments. The producer can re-arrange the music in any way he wants. He can also adjust the size of the orchestra by increasing or decreasing the number of instrumental tracks (Kesjamras, 2017).

Many music makers may find themselves struggling in producing music due to the high cost of production. The cost that they have to pay includes the studio rental, the musician's cost, the cost of sound engineer, and any other unexpected costs. Music software such as Digital Audio Workstation, also known as DAW, is a must-have for all music makers. There are many DAW in the market to choose from. It all depends on the preference of each music maker. The software can reduce the cost that one needs to pay to get the music done. This software is user-friendly and is easy to use; therefore, the music coming out from that software will sound realistic with the right touch.

The music makers must be able to do three roles in a single project: writer, producer, and engineer. A writer is a creative artist who writes music. A producer controls the business aspect of the project and ensures that the client gets the music he/she wants. An engineer needs to bring the record to life.

In the case of the Lost Tales Symphony, the author has taken all three roles to bring an album to life. He composed the music for his doctoral thesis. He produced his album the way he wanted to hear without worrying about the budget. He brought his own album to life by playing and recording all parts by himself.

Terminology

Bus is a virtual cable that is used to carry signals from sources to another destination within DAW (Hagerman, 2005).

Compressor balances the relatively loud and soft parts of a track. It is commonly used on bass tracks, vocal tracks, or on an overall mix.

DAW or Digital Audio Workstation is computer-based software that can record, edit, mix, and playback music (Kesjamras, 2020).

EQ or equalization controls the frequency of sounds. It can emphasize low or high frequency.
MIDI or Musical Instrument Digital Interface is a process of using the hardware-based system to input and output MIDI and digital audio data (Farquharson, 2006).

Mixing is a process in which sounds of audio or MIDI are combined.

Panning or pan is a distribution of sound if the sound should be on the right, left, or center.

Reverb or reverberation provides the sense of space and broadens the stereo field.

2. Objectives

1) To produce an album using a virtual orchestra
2) To explore tools and techniques in producing orchestral music with virtual instruments
3) To publish the methodology as an academic work

3. Materials and Methods

3.1 Interpretation of each episodic movement on how each movement should sound like
3.2 Set up the project by choosing the right sound patches to match the mood and tone of each real instrument in each movement
3.3 Writing MIDI data for all tracks including velocity and modulation
3.4 Mix and mastering all tracks using all necessary audio effects

4. Results and Discussion

The Lost Tales Symphony was recorded using Logic Pro X as a DAW. The sound patches used were selected from EastWest Quantum Leap Hollywood Orchestra Gold Edition. The sound package comes with string orchestra, woodwind, brass, and percussion. The overall working process is as follow: choosing the sound patches for all techniques - adjusting sound envelope – MIDI sequencing - bouncing - importing all audio files into a new project - setting up bus channel - panning - setting up EQ - volume adjustment for all tracks - adjusting reverbs and compression - mastering tracks. The discussion of the production is divided into three stages: pre-production, production, and post-production.

The sub-topic of the pre-production stage includes choosing sound patches and track setting and sounds envelope setting. The production stage is about the MIDI recording, velocity setup, and modulation. Post-production is about the mixing stage from the first mix to the final mix with necessary audio effects.

Pre-Production

During pre-production, many things need to be considered such as choosing the right sound patches for the project, the possibility to produce the playing techniques and the sound effect of real instruments with software instruments, and setting up the sound's envelope.

The sound patches play a significant role in the recording process. Some sound patches require more work in editing into sounding realistic. Some sound patches do not require much work to make them sound good. The choice is up to the music maker. The difference between each sound patch is the quality of sound and the control of the sound interface in detail.

In the case of EastWest Quantum Leap Hollywood Orchestra Gold Edition, each sound from each velocity level is recorded from real instruments in a Hollywood recording studio. One can say that using the sound from the EastWest Quantum Leap Hollywood Orchestra Gold Edition is just like recording with a world-class orchestra at a world-class recording studio.

Choosing the right sound patches can be quite a challenge as there is no perfect solution to choosing. Everything is based on preference. In the case of EastWest String Orchestra, there are several abbreviations that one needs to know such as NV, VB, MV, and RR. NV stands for non-vibrato. VB is for vibrato. MV is for molto vibrato. RR is for round-robin. The round-robin in music allows the same note to be played differently by alternating between the up bow and down bow to make the sound realistic (Philpit & Hlynsky, 2014). The instrument name for violin 1 may come up as follows: Violin 1 Long (sus) NV NV NV VB RR. It means that this violin 1 is a round-robin instrument patch played as sustain notes offering to play non-vibrato - non-vibrato - non-vibrato - vibrato.

The number of track settings must be done accordingly to the playing techniques of instruments. For example, a passage contains both legato and staccato, two tracks must be set up as one is for recording legato and one is for recording staccato. The score as seen in Figure 1 may need to have up to four tracks to record the passage.

Figure 1 The flute passage in the Dawn of Time

From Figure 1, flute 1 and flute 2 play both legato and staccato together. The track setting should have at least three tracks. One track is for legato of flute 1. Another track is for legato of flute 2. The third track can be set for staccato of flute 1 and flute 2. The advantage of having three tracks instead of four tracks is that it is not overloading the CPU. However; if one is to set as four tracks, one track should be set as the staccato of flute 1 and another track should be set as the staccato of flute 2. The advantage of separating all tracks is it will be easier to mix the sound as one might want to have one of the staccato tracks louder than another.

Playing techniques and sound effects of real instruments can be quite a challenge for MIDI sequencing. As seen in Figure 2, the sixteenth-note run in violin 1 requires another violin 1 track, other than Violin 1 Legato track, called Slur Runs. The slur runs are only available for violin 1 and violin 2. It allows the producer to record the fast-playing scale. It features three components as following: fast notes in the run, slur between each note, and longer notes in the middle or at the end of the run. Combining with a regular violin legato sound patch, the passage is smooth and full of emotion.

Figure 2 The introduction passage of Violin 1 from the Shieldmaiden

The sound envelope is a term referring to the shape of sound such as an attack, decay, sustain, and release. Each instrument and each technique have a different sound envelope. The default sound envelope for string tremolo offered on the selected sound patch can be seen in Figure 3. The attack is set to have a strong attack; however, the passage as seen in Figure 4 is supposed to be played softly. Therefore, the sound envelope needs to be adjusted to have a lighter attack at the beginning of the sounding note so that it matches the mood and tone of the passage as seen in Figure 5. The total width of the graph represents the total length of the

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phrase of the envelope. If one adjusts something in one part of the graph, the slope of other components changes as well (Coffman, 2015).

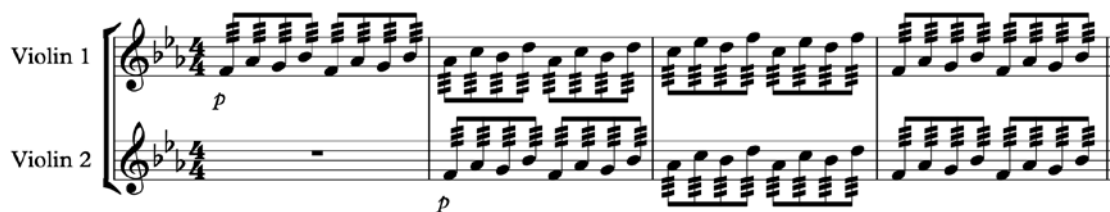**Figure 3** The default sound envelope of the tremolo

Figure 4 The tremolo passage in the Valor of Men

Figure 5 The adjusted sound envelope of the tremolo

The track setting in most music of the Lost Tales Symphony is as follow:

Flute 1 Legato - Flue 2 Legato - Flute Staccato
Oboe 1 Legato – Oboe 2 Legato – Oboe Staccato
Clarinet 1 Legato – Clarinet 2 Legato – Clarinet Staccato
Bassoon Legato – Bassoon Staccato
Horn 1 Legato – Horn 1 Staccato - Horn 2 Legato – Horn 2 Staccato
Trumpets Legato – Trumpets Staccato
Trombones Legato – Trombones Staccato

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Tuba Legato – Tuba Staccato
Drums – Cymbal
Violin 1 Legato – Violin 1 Staccato – Violin 1 Tremolo
Violin 2 Legato – Violin 2 Staccato – Violin 2 Tremolo
Viola Legato – Viola Staccato – Viola Tremolo
Cello Legato – Cello Staccato – Cello Tremolo
Double Bass Legato – Double Bass Staccato – Double Bass Tremolo

The total numbers of the track are 38 tracks. If there are more instrumental techniques in the piece such as pizzicato, slur run, glissando, or portamento, the numbers of track increase as well.

Production

The production process includes MIDI recording, modulation, velocity setup, and quantization. As mentioned above that the music makers need to do three roles in a single project, musician is another role that should be added. When doing the MIDI sequencing, one needs to think like a musician even one cannot play that certain instrument as to how the musician would interpret the passage or how the passage should be played, or how the passage should sound like. The recording can be done via MIDI controller in which included the usage of the modulation wheel.

The modulation wheel manipulates sound differently in each sound patch. The texture of sound can change from soft and sweet into more majestic and powerful in some sound patches. The modulation wheel can control the amount of vibrato in some sound patches. The usage of modulation can be done in two ways: doing it during recording or doing it during editing. The advantage of doing the modulation during the recording is one can hear the change in sound right away. If the sound is not right as one had intended, the modulation can be adjusted in the editing window.

Velocity is a term referring to how strong the note is stuck on the keyboard. It does not mean that the note with high velocity must always be louder than other notes. The volume can be adjusted during the mixing session. Sometimes, the velocity is set to produce a certain sound effect that cannot be done with lower velocity. The modulation can also be used together with velocity. The results vary depending on the passage.
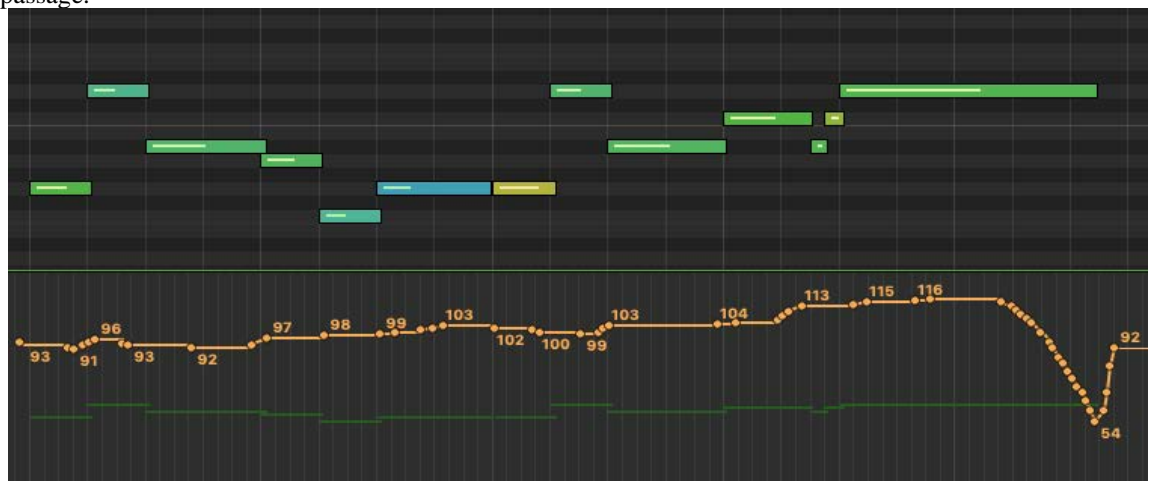

Figure 6 The MIDI passage with velocity and modulation compared to the same passage in music notation

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From Figure 6, the music notation is recorded with modulation and velocity setting. The music should be performed in p; therefore, the modulation and velocity are set low as well. The melodic contour of the second passage is ascending, the modulation moves up slightly as well.

Quantization is a function that can adjust any offbeat to be on the correct beat. The quantization must be adjusted, as each track is recorded one track at a time. One single offbeat note can ruin the overall sound of the music. However, some passages should be played in rubato or ritardando, the quantization should still be used to make the beat equal. The rubato/ritardando can be adjusted via tempo change (Gerliche, 2013). The reason that the process must be done this way is when recording many instruments, each instrument must be recorded one by one, which means the music maker has to listen to the metronome when recording each track without hearing what the other recorded track sounds like. When adjusting the tempo on the master track, the tempo of all instruments will be adjusted in the same curve equally (Figure 7). To make it sound realistic, one must be careful when adjusting the tempo, the curve tools should be used so that the music will be slowing down naturally.
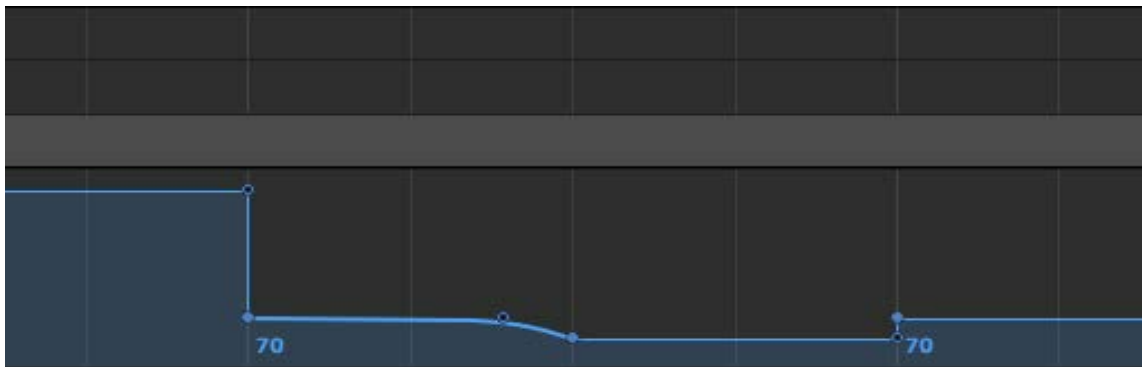

Figure 7 The tempo curvature adjusted for rubato or ritardando

Post-Production

The post-production process deals with mixing and mastering stages. Before the mixing period, one must convert the MIDI file into an audio file as the MIDI file can overload the CPU. It is important to make sure the head of all MIDI regions starts at the same time. The file conversion process is called bounce in Logic Pro X. There are real-time and offline bouncing. The real-time bouncing plays the selected track and converts at the same time. If there is any clipping or skipping sound during the bounce, the final result will have the same flaws. However, the bounce session can take from several minutes to several days depending on the number of tracks and the duration of the music. The offline bouncing will not play the selected track during the conversion. No one knows if there are any clipping or skipping sounds on the final result until it is imported and played in the mix window. If there is such a case, one needs to go back to the MIDI project and start the conversion process again. Once all MIDI tracks are converted into audio tracks. A new project must be opened and all audio tracks must be imported in.

The steps, suggested by Sacco in his YouTube video, states that the mixing should start with panning the instruments, setting up the reverb, using EQ, using a fast limiter to make the overall sound as loud as possible, and using volume automation (Sacco, 2016). These steps are useful; however, the order of these steps is flexible depending on the preference of each music maker.

From Figure 8, there are several separated tracks from the same instrument. It is important to make sure that all these tracks have the same sound effect and the same amount of panning. The bus channel must be used. For example, all flute tracks are assigned bus channel 1.

Figure 8 The main mix window

Using the bus, audio effects such as EQ, reverb, compressor, and panning can be applied to any instrument belong to that certain bus channel. In the case of the Lost Tales Symphony, the sound patches already provide good sound; therefore: only EQ and panning are applied to each bus channel.

From Figure 8, all tracks within the same group of the instrument are assigned to the AUX channel via bus as seen in Figure 9. Since the sound from EastWest Quantum Leap Hollywood Orchestra Gold Edition is already good out of the box, there is no need to insert many unnecessary sound effects. EQ is used for all tracks as the EQ can adjust and bring out the best frequency for each instrument. Reverbs are used on some tracks that the instruments are supposed to be far away from the conductor so that the output sound does not sound so close nor so clear. Compressors are used on the cello and double bass tracks to control the dynamic of both tracks and make sure that it is not too loud or too soft on some passages.

Figure 9 The effect used on the mixer window

       Once all necessary effects are assigned to all tracks, the mixing session can begin with panning and volume automation. In some passages, the automation must be done on every single note. For the panning of instruments, the author based the panning on the position of the real instrument in an orchestra from the conductor's point of view.

       From Figure 10, one can notice that violin 1 should be on the far right in which the panning should also be set to the far right. In a live performance, the audience can hear the sound through the reverb produced by the hall's acoustic; therefore, the sound of violin 1 will still be right, but not as right as heard by the conductor. When it comes to the panning of violin 1 in the virtual orchestra, one cannot set the pan to the far right as it would produce an unrealistic sound in the ears of the audience since there will not be any sound coming out from the left speaker.
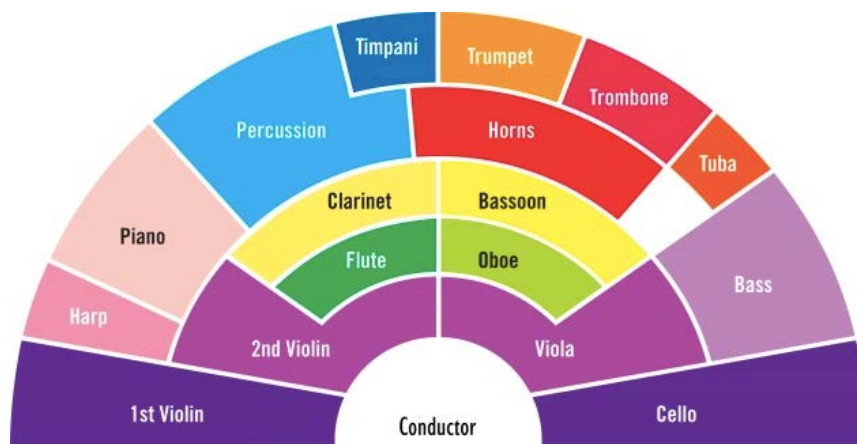

Figure 10 An orchestral position

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The panning of each instrument is as follow:

> Flute – L-14, Oboe – R+14, Clarinet – L-7, Bassoon – R+7
> Horn – R+5, Trumpet – R+3, Trombone – R+5, Tuba – R+14
> Drums and Cymbal – L-14
> Violin 1 – L-30, Violin 2 – L-15, Viola – R+15, Cello – R+30, Double Bass – R+25

The highest amount of panning is on 30, which means that the panning was not set to be totally on one side. The sound can be heard more from one side than the other side so that it mimics the output sound of the real orchestra in a concert hall. Since all 9 episodic movements were supposed to sound like they have been recorded in a single recording session, all movements should have the same panning set up.

Another sound effect that one cannot overlook is a reverb, not only it can provide a sense of spacing, but also provide the depth of sound from the instrument that stays around the back of the stage. It can make the sound sounds like it is coming from far away. Another effect of reverb used in the album is they can provide the sense of multiple instruments playing together. In a live performance of the Lost Tales symphony, three drum sets were playing all together in unison with the orchestra. When all drums play in unison, it creates a massive force of energy to build up the atmosphere for the pieces. Using virtual orchestra, the effect of putting three drum sets together does not work the way the composer had intended. Three drum sets playing together does not provide the massive force of energy, it only makes the sound louder. To get the effect of a massive force of energy, a reverb was used on drum tracks so that it sounded like multiple drum sets were playing in unison. The amount of wet and dry must be tried out and carefully adjusted for the best result. The reverb for drum tracks is shown in Figure 11.

Figure 11 The reverb set for drum tracks

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Volume automation is a term referring to the volume adjustment of tracks. Levels of sounds change over time. The volume of some instrumental part needs to be pulled up then back down as another instrumental part enters. The volume automation may need to be adjusted on every single note in some cases. The example of volume automation is shown in Figure 12.
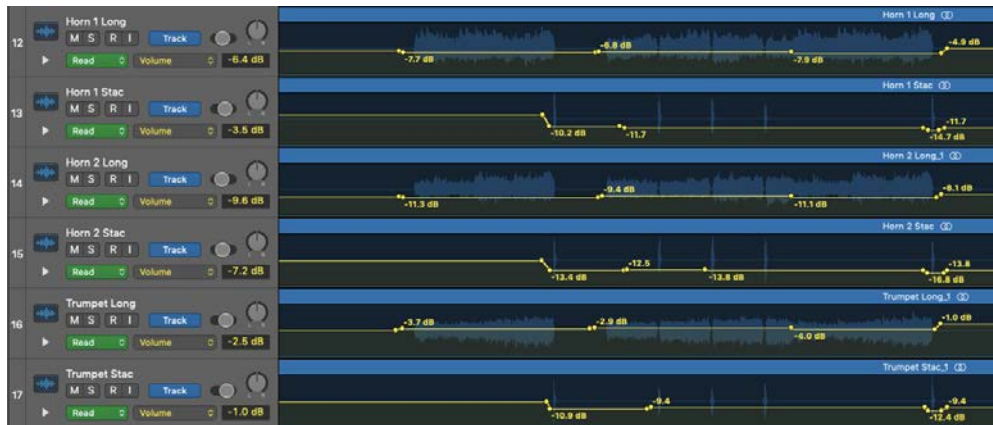

Figure 12 The volume automation adjusted for The War of Wrath

The final result of the mix is displayed in the *Stereo Out* channel strip. The final volume of the overall track can be adjusted via the fader. The final sound effects can be inserted as well. EQ, reverb, and compressor are used. Since all 9 episodic movements belong in the same album, the reverb should be set the same as seen in Figure 13.

Figure 13 The reverb used on all 9 episodic movements

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Mastering tracks is the process of adjusting all tracks to be consistent in level and sound. In the case of the Lost Tales Symphony, one can say that the mastering is done along with the mixing process. In fact, mastering requires opening another mastering project to check on the sound level and frequency.

5. Conclusion

The Album, *The Lost Tales Symphony,* has been recorded and produced using Logic Pro X and the sound patches from the EastWest Quantum Leap Hollywood Orchestra Gold Edition. The techniques and methodology used in MIDI sequencings such as velocity and modulation, mixing, and mastering such as panning, EQ, compressor, and reverb can be applied to other symphonic works of any composer. All production stages can be applied to other kinds of music, not only symphonic works. The Lost Tales Symphony can be listened to and is available on the author's SoundCloud channel at https://soundcloud.com/sith_kesjamras.

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