

# เทคโนโลยีสำหรับนักแต่งเพลงและนักประพันธ์เพลง TECHNOLOGY FOR SONGWRITER AND COMPOSER

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## บทคัดย่อ

วัตถุประสงค์และวิธีวิจัยในงานนี้คือการสำรวจวิธีใช้งานผ่านการทดลองใช้ซอฟต์แวร์ดนตรี รวมไปถึงการศึกษาข้อจำกัดของซอฟต์แวร์แต่ละประเภทด้วยการทดสอบผลิตบทเพลงสั้น โดยเลือกใช้เทคนิคที่เหมาะสมกับดนตรีในแต่ละประเภท เทคโนโลยีและเทคนิคที่ใช้ในการผลิตดนตรีแต่ละประเภทได้ถูกนำมาสรุปและนำเสนอในงานวิจัยนี้ รวมไปถึงการใช้งานเครื่องดนตรีเสมือนจริง การใช้โปรแกรมเสริมและเทคนิคการโปรแกรมระบบมิดิ ในการสร้างเสียงดนตรีที่สมจริง

งานวิจัยนำเสนอบทสรุปของการผลิตดนตรีโดยใช้ซอฟต์แวร์ทางดนตรี นักแต่งเพลงและนักประพันธ์เพลงสามารถลดต้นทุนในการผลิตผลงานเพลงด้วยการใช้เทคโนโลยีดนตรี ซอฟต์แวร์ที่ใช้ในดนตรีสามารถจำแนกออกเป็นสามประเภทตามหลักการใช้งานคือ ซอฟต์แวร์การบันทึกโน้ต สตูดิโอเสมือนจริงและการทำงานเสียงดิจิทัล ซอฟต์แวร์การบันทึกโน้ตคือ ซอฟต์แวร์ที่ใช้ในการเขียนโน้ตเพลง ซอฟต์แวร์สตูดิโอเสมือนจริงคือ ซอฟต์แวร์สำหรับสร้างเสียงประกอบที่แสดงการทำงานด้วยภาพกราฟิก ซอฟต์แวร์การทำงานเสียงดิจิทัลคือ ซอฟต์แวร์สำหรับการบันทึกเสียง การแก้ไขและการปรับเสียงเพลง

**คำสำคัญ** : การประพันธ์เพลง/ ซอฟต์แวร์ดนตรี/ การแต่งเพลง/ เทคโนโลยีดนตรี

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## **ABSTRACT**

The objective and methodology of the study were to explore, experiment the usage, and study the limitation of each type of music software and to produce short musical passages from each type of music software. Experimentally, the tools and techniques of music producing were summarized and presented in this research. Virtual instruments, Plug-in, and MIDI sequencing techniques to produce realistic sounds were also being introduced.

The research presented a brief summary of producing music using music software. Using technology in music, the songwriter and composer can reduce the cost when producing music. There are three types of music software classified by the main usage of each type: a notation software, virtual studio software, and digital audio workstation. A notation software is to produce music scores. A virtual studio software is to produce backing tracks for various usages. A digital audio workstation is to record, edit, and mix the music.

**Keywords:** Music Composition/ Music Software/ Songwriting/ Music Technology

## Introduction

In the present day, music has become widely known throughout the global regardless the age, gender, and nationality. Music has evolved since the ancient days until present with variable in styles, genres, and purposes of the music. People may find themselves enjoying music through listening, while others may find themselves enjoying music through performing or composing. As such, numbers of career in music industry have expanded exponentially.

Many young and amateur music enthusiasts may find themselves interested in getting into music industry. Some would like to be a performer, while some aim to be working behind the scene. The performer needs a place where he/she can perform as a soloist or as in group. The composer and songwriter may need someone to play and record their music. As everyone in music industry is aware of, everything has its own cost. The performer may need to rent the place to give live performances. Some place can be used for free while some place is not. If the performer needs to distribute the music in other formats such as CD or MP3 to get more audience, they would need to rent a recording studio to record the music. As for the composer and songwriter, the recording studio is a requirement to get their music out to the public.

With current music technology, music can be produced with any platform. Music software is considered to be a must-have for any music student and professional musician. The software developer tries to develop the software so that it is easy to use and compatible on any device. Using music software may solve many financial problems for freelance, newcomer, professional musician, composer, and songwriter; it keeps the cost of renting the recording studio down. It can create a professional-looking music score. It can be an effective orchestration tools. It can offer a chance for performer to perform their music live via online platform.

In order to reduce the cost of producing music, composer/songwriter needs to be able to do three roles in a single project. The first role is a writer. A writer is a creative artist who write or compose the music. The second role is a producer who controls the business aspect of the project. The producer needs to ensure that the customer is getting the music they want. The third role is an engineer who renders the recording and brings the recording to life. The success of songwriter and composer depends on the quality of final product. Using a writer with capabilities of producing and engineering his/her own recordings, clients can get the product faster and cheaper than ever.<sup>1</sup>

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1. Michael Farquharson, Writer. Producer. Engineer. *A handbook for Creating Contemporary Commercial Music* (Boston, MA: Berklee Press, 2006), xi-xii.

## Terminology

ADSR stands for Attack, Decay, Sustain, and Release. Attack is the initial attack of incoming sound. Decay is the first quick reduction of sound from initial attack. Sustain is the length of sound that holds without noticeable reduction. Release is the moment that sound becomes inaudible.

Bus is a virtual cable that is used to carry a signal from the source to another destination within DAW.<sup>2</sup>

DAW stands for Digital Audio Workstation. It is a computer-based software or a host application that can record, edit, mix, and playback the music.

Loops are sequences that have been composed and arranged in a way that their heads and tails are connected to each other.<sup>3</sup>

MIDI is a short term for Musical Instrument Digital Interface. It is a computer protocol that allows communication between devices such as instruments, sound modules, computer, and other equipment.<sup>4</sup> MIDI is perhaps the most popular and affordable tools in present-day recording session.

MIDI sequencing is a term referring to a process of using a hardware-based system to input and output MIDI and digital audio data. Musical information is stored as data in which it allows the computer to record the signals created by a controller such as keyboard. The data is then manipulated to create new sound.<sup>5</sup>

Plug-in or plugin is a software designed not to be able to run on its own, but rather work with a host application.<sup>6</sup>

Velocity is a term defining how hard the note is struck when it is recorded.

Virtual Instrument is a software instrument that simulate the sound and characteristic of real musical instrument. Virtual Instrument is widely used in everyday's work in music industry

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2. Andrew Hagerman, *Digital Music Making for Teens* (Boston, MA: Thomson Course Technology, 2005), 290.

3. Paul Hoffert. *Music for New Media Composing for Videogames, Web Sites, Presentations, and other Interactive Media* (Boston, MA: Berklee Press, 2007), 26.

4. Michael Farquharson, Writer. Producer. Engineer. *A handbook for Creating Contemporary Commercial Music* (Boston, MA: Berklee Press, 2006), 131.

5. \_\_\_\_\_. Writer. Producer. Engineer. *A handbook for Creating Contemporary Commercial Music* (Boston, MA: Berklee Press, 2006), 131.

6. Andrew Hagerman, *Digital Music Making for Teens* (Boston, MA: Thomson Course Technology, 2005), 290.

such as music from TV series, film trailers, music in short films, music in video games, and commercials in both TV and radio.

Virtual Instrument is a software instrument that simulate the sound and characteristic of real musical instrument.<sup>7</sup> Virtual Instrument is widely used in everyday's work in music industry such as music from TV series, film trailers, music in short films, music in video games, and commercials in both TV and radio.

### **Objectives of the Study**

1. To explore different types of music software and its main usage
2. To explore and summarize the techniques and process in producing music using virtual instruments

### **Methodology**

1. Experimenting the main usage and the limitation of different types of music software
2. Creating short song passages within different types of music software

### **Outcome**

1. Exploration of three main types of music software, main usages, and differences
2. Summarization of techniques and process in producing music using virtual instruments

### **Discussions**

There are three main types of music software. The first type is music notation software which is used for creating professional music notation in any style. The second type is virtual studio software. It is used to arrange and create backing tracks for comping practice for soloists or for producing demo for songwriter. The third type is digital audio workstation software which can record, edit, mixing, and mastering the sound from both real instruments and virtual instruments.

### **Music Notation Software: Sibelius**

Sibelius is a music notation software that can create a very professional music score. The software comes with playback function that allows the user to hear the written music. It can be used to notate for any instruments in both traditional notation and contemporary notation for all genres of music. With the new version of Sibelius, the playback sounds have become much more realistic; but it is still far from sounding realistic to most ears.

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7. Schuele, Nico, "What Are Virtual Instruments' When code and music overlap: how they are built and played in order to create realistic sounding music." Accessed in January 27, 2020. <http://medium.com/pragmatic-sound/what-are-virtual-instruments-c762055ddf71>.

The software supports MIDI in which MIDI can be imported or exported to be further used with other music software. Some composer may create the full-score of his/her music and then export the MIDI to be used in Logic Pro so that the sounds of his/her music can be edited and used as an audio reference. The user may export the sound in MP3 format using built-in sound patch for Sibelius. With some further editing and mastering in DAW, the exported sound can be used as an orchestral mock-up. There are approximately three effective methods in producing music using Sibelius.

The first method is to export the file as MIDI, and then import the MIDI in DAW directly. From DAW, the user can use different sound patches and edit the MIDI to make the music sounds realistic.

The second method is to export the file as audio file. Before exporting the file, the user has to overly adjust the dynamic of each musical passage. For example: if the passage has mp and p as dynamics, the mp has to be adjusted to mf or f, and p has to be adjusted to pp. This is because the increasing in the gap of dynamic range can emphasize the importance of the main melodic passage. Once or dynamic details are fully adjusted, the whole project can be exported as audio file. The file can be used as it is or it can be imported to DAW for further editing.

The third method is similar to the second method in term of adjusting the dynamic. The third method requires the user to export the audio file by one instrument at a time. For example: if the user wants to produce a string quartet piece in which composed of Violin I, Violin II, Viola, and Cello, the user needs to export only Violin I by either mute or erasing all other instruments. And then the user needs to do the same step with other instruments. After completing exporting process, the user would have four audio files consisted of Violin I, Violin II, Viola, and Cello, the user has to import all four files in the DAW in order to edit the balance of the sound and add sound effects.

### **Virtual Studio Software: Band-in-a-Box**

Band-in-a-Box provides accompaniment in various styles so that the solo musician can practice their solos. This software is not intended to be used for classical music. It is designed to be used in contemporary music such as Pop / Jazz / Funk / Samba / Bossa / R&B / Hip hop.

Band-in-a-Box can export the project in MIDI format. The user can import the MIDI to other music software such as Logic Pro. From there, the user can change the instruments, edit

the sounds, mix and mastering into a decent quality demo. The user can also use Band-in-a-Box as an arranging guideline for his/her project.

The new version of Band-in-a-Box offers plug-in to be used within DAW. It reduces both time and trouble that one might encounter as its previous version as there is no need to export the MIDI and then import the MIDI to DAW. The new version offers a solo track in which the software can create and play a solo passage on certain instrument based on chord progression and tempo that user has typed in.

When producing music with band-in-a-Box, the user needs to type in chord progression in Band-in-a-Box window, choose a preferred style, mark the section of a song as A and B at the chosen measures, and set up the tempo of the song. The tempo of the song that is set up in Band-in-a-Box window has to match with the tempo in DAW. The mark of the section of the song allow the software to play sub-style of chosen style. For example: A is marked on measure one and B is marked on measure nine. The software will play the chosen style such as funk or swing from measure one to measure eight, then the software will play the sub-style of the chosen style in measure nine. The sub-style is slightly different from the main chosen style. After setting up all necessary information of the song, the user has to click on generate and then drag the generated file from Band-in-a-Box window to DAW window. The user can then record the main melody using either real instrument or software instrument into the project. And then the project can be mixed and mastered.

### **Digital Audio Workstation: GarageBand/Logic Pro**

GarageBand and Logic Pro are music software designed to be used in Mac platform. GarageBand can be used by any new beginner musician anytime as the software is very user-friendly and available in all Apple devices including iPad and iPhone. All the necessary editing functions and sound patches are ready to be used.

For more editing functions and more realistic sound samples, one cannot overlook the Logic Pro as it can edit the MIDI in more details. Logic Pro offers bigger sound library than GarageBand; including more pre-recorded loops and sound effects. Logic Pro can be very powerful composition and orchestration tools. It can effectively create music and sound effects for any video projects such as commercials, video games, short films, and full-length feature films.

On the basic Logic Pro X interface, there are several useful buttons that allow the user to control all aspect of the project.

- Library button shows all available software instruments.
- Inspector button shows settings of each track including sound effects, bus channel, panning, and volume.
- Toolbar button shows the toolbar in which contains more buttons for more functions.
- Control button can quickly modify the sound of each patch or region.
- Mixer button shows channel stripes for each track in which plug-ins and other customization can be edited to each track.
- Editor button allow the user to edit both audio and MIDI region.
- Quantization button found in editor function is used to edit MIDI event so that the MIDI event is placed in the correct timing or correct note.

When working with MIDI event, everything about each event can be edited including pitch, rhythm, timing, velocity, modulation, dynamic, and expression. It is quite different when working with audio file. The audio file is presented in a wave-like pattern in DAW. The user can cut, copy, and paste the audio file; however, most DAW does not allow the user to edit pitch or rhythm of audio file.

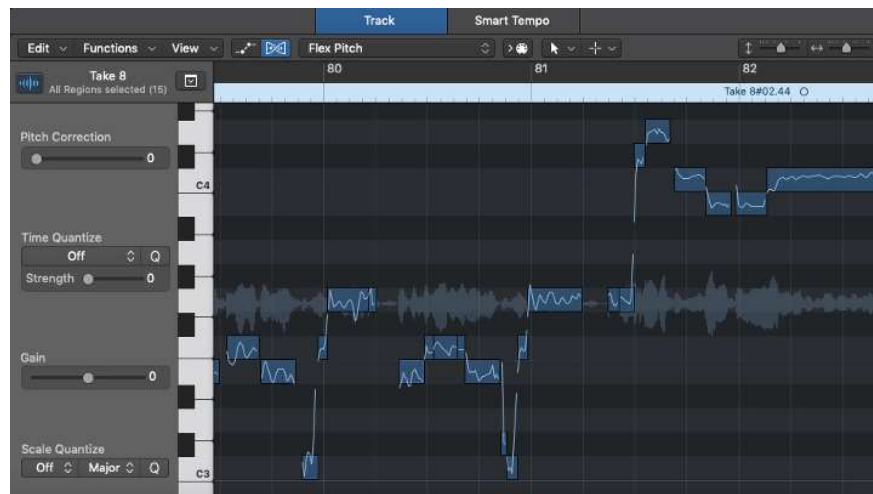


Figure 1. Flex-Pitch function in Logic Pro X  
Source: the researcher

Flex-pitch function in Logic Pro X can edit the sounds of vocal recording. It can adjust the off-tempo and off-pitch back into correction by sliding each sound bar. In the past, the user would need another software or plug-in to edit the vocal track. In Figure 1, the bar stands for each main note that the singer has sung. The line inside the bar states the vibration and curvature of the pitch. The vibration should be kept as is so that the edited passage sounds natural.

When writing for popular music, the user can choose any built-in instruments whether they are guitar, bass, drums, or piano. All of these mentioned instruments have realistic sounds in which very little editing is required.

In case of drum set, a Logic Pro drum set is based on a standard drum set which consists of 1 bass drum, 1 snare, 2 tom-toms, 1 floor tom, 1 hi-hat, 1 ride cymbal, and 1 or 2 crash cymbals. It is up to the composer/songwriter to choose the right drum set. Each drum set contains different sounds, attack, and reverb that are pre-set for immediate usage in which can be further adjusted to suit the preference of the user.



Figure 2. Basic drum pattern  
Source: the researcher

Given the drum pattern as seen in Figure 2. The hi-hat is executed in straight eighth-note pattern. It is much easier to adjust the velocity of each note equally, but it would sound unnatural and unrealistic to most ears. The drummer executes the velocity of the hi-hat unequally as the beat 1 is the strongest attack. It is attacked as strong as the bass drum. The attack in beat 3 is also strong, but not as strong as in beat 1. Beat 2 and beat 4 have weaker attack than beat 1 and beat 3. Each upbeat is lighter than each of its downbeat.

Different genre of music requires different velocity setting depending on the user's preference. The velocity rate is defined by color and number. The maximum number is 127 while the lowest number is 1. Red color stands for high velocity in which the highest number is 127. The orange/brown color also stands for high velocity around in which the number is around 110. The yellow color stands for mid/high velocity. The green color stands for middle velocity in which the number is around 70. The velocity of virtual instruments is not as sensitive as if it is played by real musicians. The number 120 and 127 does not make any different in sound; however, there is a big different between number 110 and 111. The user has to decide which sound they want to hear in their music. They can adjust the volume of each passage to make the passage louder instead of adjusting the velocity.

When working with classical instruments, more editing is required as each instrument in the orchestra has different shape of attack, decay, sustain, and release. For example: violin can perform two or more notes in a single bow depending on the passage and its expression. In Logic Pro, each note is recorded in a form of a MIDI event. In each MIDI event, the attack, decay, sustain, and release information is recorded as well

When a piano key is struck, it creates a strong attack, and follows by a quick decay. The sound of sustain is fading within duration of each note. The release is sudden as soon as the pianist lifts the finger. If the finger is not lifted from the key in time, the sound is faded out into inaudible.

The violin has slightly slower attack than other instruments such as piano or guitar. Violin is bowed to produce sound; therefore, there is no decay in the violin's sound envelope. Violin has a very long sustain until the bow stops, then the sound is faded.

According to the sound envelope in Figure 3, if the passage is play in one bow, the attack stays in the first note of the passage only. However, when playing the same passage using MIDI, the attack stays on every note; therefore, there are small gaps between notes in the passage. To solve the problem, the user needs to draw the edge of each MIDI event slightly longer than usual so that the end of each MIDI event is overlapped with the beginning of the following MIDI event. The beginning of the MIDI event can be placed right on the beat or it can be placed slightly before the beat. When the beginning of the MIDI event is placed on the beat, the actual sound of attack is slightly delayed. When the beginning of the MIDI event is placed slightly before the beat, the actual sound of attack is landed right on the beat. This is a matter of preference.

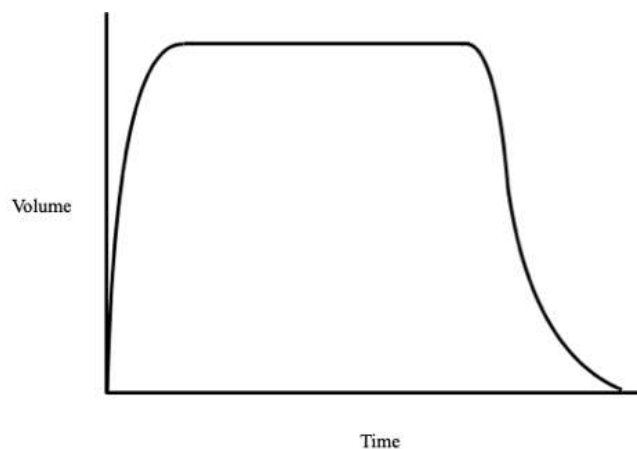


Figure 3. The sound envelope of the violin  
Source: the researcher

Choosing the right sound patch is a good way to get started. In case of sting, string sound patch comes in both ensemble patch and individual patch. The sound from ensemble patch consists of sounds from string ensemble which can be a great tool if the string part is not the main focus in the music. If the string part provides the main melody in the music, the string ensemble patch is not the best choice to choose. For example, if the note C5 is played, all instruments in string ensemble play C5 which could be out of range for some instruments. In this case, the individual string patch is best suited for the job.

Third party sound patch can offer greater sound than built-in sound patch. In case of symphony orchestra, there are many software companies offering sound patches to be used as DAW or as plug-in for DAW. EastWest Quantum Leap or EWQL is one of companies that offer plug-in virtual orchestra. The plug-in requires PLAY in order to use the sound from the plug-in.



Figure 4. Basic PLAY interface in Logic Pro X  
Source: the researcher

When choosing instrument in PLAY interface as shown in figure 4, the interface comes with pre-set ADSR in which can be adjusted. The microphones position can also be adjusted. Each instrument and each articulation come with different pre-set in which the user needs to experiment with different adjustment and chooses the preferred sound.

For better and more realistic sound, the adjustment such as volume and modulation can be done using Automation in editing window. When editing modulation, the sound is slightly manipulated such as texture of sound and vibration.<sup>8</sup>

8. Sit Kesjamras, "Yggdrasil: A Music Composition for Synthesizers and Rhythm Section" (Proceeding in RSU International Research Conference, May 1, 2020, Pathum Thani, Thailand), 1001.

Mixing and mastering session can start with converting all MIDI region into audio format since the MIDI can take up a lot of CPU usage of the computer; thus, it would freeze the computer or slow down the computer in some case. Converting from MIDI must be done one track at a time. The user can choose between offline and real-time conversion. The offline conversion lets the software converts the MIDI at high speed. The real-time conversion lets the user listen to the audio track while the software converts the MIDI. Once all MIDI tracks are converted into audio files, all audio files must be opened in a new project.

When editing and mastering the music, the user can edit each track individually or as in instrumental group by assigning Bus channel. The user can control the percentage of signal sent to each Bus channel and the user can add sound effect directly to Bus channel. With this method, sound effects are applied on every instrument in the assigned group. The sound can then be mixed and adjusted for better balance by using:

- Channel EQ is to bring out the desired frequencies of each instrument or each Bus channel
- Panning is to assign the position of incoming sound from left or right
- Reverb is to set up the acoustic of the room/hall in which the music is recorded
- Compressor is to reduce sounds that exceed a certain threshold level, smoothing out the dynamics and increasing the overall volume

From there, other adjustments such as volume automation, panning automation, modulation can be done on each track or each Bus channel.

## **Conclusion**

Notation software is a great tool for all level of musician. It can create a professional music score. It can play the written music. It can also export and import MIDI to be used in many other ways.

Virtual studio and virtual instruments are great tools for composer and songwriter as their music can be produced directly by themselves. Each composer and songwriter may have their own ways of sequencing the MIDI and their own ways of producing music. Some may notate the music using the music software then arrange and record in DAW. Some may arrange their music using Band-in-a-Box then mix and edit in DAW. Some may compose, arrange, and record in DAW from the beginning. After they finish editing, mixing, and mastering the music, they can publish their music to the audience through social media. With technology nowadays, the audience can be reached easily and directly.

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