Analysis Of Different Types of Digital Audio Workstations

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Abstract. With the development of technology, digital audio workstation (DAW) has become a must-have tool for modern music production, which allows music producers to edit, record, mix and add effects on the computer to create music works of various styles and qualities. This paper mainly introduces the definition, purpose, function, type and development of DAW, and how to choose the appropriate DAW according to individual needs. This article compares and analyzes three commonly used DAWs (Apple Logic Pro X, Cubase 12, Ableton Live Lite 11) from the aspects of personal budget, user experience, software operating system compatibility, long-term development, and whether live performances are needed. Their advantages, disadvantages and application range are pointed out. This paper also points out some limitations of DAW, (e.g., the requirements of hardware and software conditions, the difficulty of learning and mastering, the problems of music creation), and looks forward to the future development direction of DAW (the improvement of user experience and personalization, the utilization of cloud computing and artificial intelligence, and the integration of other fields and media). These results can help independent music producers to understand the basic situation and selection criteria of DAW, so as to better use DAW to create and express their own music ideas, and provide some reference and inspiration for further improvement and innovation of DAW.

Keywords: Digital audio workstation, personal budget, user experience, software compatibility.

1. Introduction

Digital audio workstation is also music production software, it is like a painter painting the necessary brush and white paper, as long as one has talent and creativity, one can draw "music scroll" through DAW [1]. Before describing computer music, it is necessary to complete a conceptual supplement, even if what is specific music. Figurative music directly records the sound, creates directly on the sound, and hears the whole face of the sound, and no longer needs abstract tools such as symbols to transition, and the creative method itself is figurative [2]. The existing electronic audio work is not overnight, it contains a number of initial germinations, mid-term development and stage. In the early embryonic stage, in 1949, France's Schaeffer bore the brunt of completing the first concrete music work "Subway Etude", and then created its most successful concrete music work "Symphony for a lonely man". Early concrete music mainly through the nature or life world sound, and then the material cut, paste, deformation and other technical processing, and finally organized into a complete music work [3].

In 1951, Radio Cologne of the Federal Republic of Germany first began experimenting with electronic music. In 1953, composer Emmert produced the early electronic music "Harmony Etudes" at the station. The electronic music laboratory established by Emmert in Germany does not use external sounds, which is the use of sine waves generated by electronic oscillators to produce music through modulation, filtering and other means. In the early 1950s, electronic music was produced after various calculations. The biggest influence in the early days of pure electronic music creation was Stockhausen. In 1954, he produced two electronic Etudes and recorded them on CD. In this work, it produced 193 acoustic materials using sine waves. It had a great influence on European and American composers [4]. In 1956, Stockhausen released Gesang Der juenglinge (Song of Youth), a method of processing voices with both concrete music and pure music, from which electronic music began to grow into a blend of pure electronic and concrete music [5]. French musician Varese created electronic poetry in 1958 at the Brussels World's Fair by fusing electronic noises with airplane sounds [6]. At present, professional, semi-professional and amateurs will use DAW to produce their music

works. In addition to instrument players, many famous musicians will use DAW drum machines, synthesizers and other analog instruments to produce songs. This tendency will only intensify due to science and technology's ongoing advancements.

In the middle stage, in the early 1950s, Herbert Beral and Harry Olson built the Mark II RCA sound synthesizer, which was later donated to the Columbia-Princeton Electronic Music Center and was the most advanced electronic music instrument of its time [6]. The period of the synthesizer, which integrated sound generation and processing, came into being for electronic music in the 1960s. By choosing and modifying control knobs, producers of electronic synthesizers may produce a wide range of amazing sounds that directly affect pitch, rhythm, force, and timbre.

At the present stage of the development of electronic music, various technologies have burst out new vitality with the development of computer science and technology and the enhancement of various hardware function modules [7]. With the development of electronic computers, electronic music has entered a new era. Digital technology is used by Mylins in the US to produce waveforms and sound. The sound created by these new technologies is actually the same as the sound of other natural instruments, which are the raw materials of artists. With the sound produced by electronic means, the composer only has richer materials in his hands, of course, it is not the more talent, the stronger the artistry, whether to create excellent works of art, but also rely on the creativity and talent of musicians [8].

The creation of electronic music mainly obtains various new sound sources through recording and electronic music technology. In order to transform, degenerate, vary, recombination, regenerate, compound, or compose works, it either uses sine waves to produce the so-called pure tone without overtone, or human voice, traditional acoustic instrument sound, or it combines them with specific music using analog or digital audio technology [9]. Hence, the time of controversy began for all types of production software. Using these technological tools, one may haphazardly mix a few weird noises and diverse rhythms to create a range and speed that the human voice and Musical Instruments cannot achieve. One can also construct a variety of fictitious sounds that are present throughout the cosmos.

Choosing DAW is a difficult choice for independent producers. Each DAW has its advantages and disadvantages, and its own controversy. In fact, as long as one considers the following points according to the personal needs, choosing DAW is not so difficult. In order to help independent producers make a choice, this paper first introduces the definition of DAW and its purpose, then describes it from the aspects of personal budget, user experience, software operating system compatibility, long-term development and whether there is a need for live performance, etc. Finally, the current situation of DAW is summarized, and the future development is forecast.

2. Basic Descriptions of DAW

DAW is a computer program that is mainly used for editing, recording, and mixing. Thus, one can record various sounds, place tracks, rearrange, splice, cut, paste, add effects, and complete a series of tasks required for music production [10]. The basic functions of DAW can be used to produce and record music, but also to process recorded audio files according to specific requirements for more satisfactory results. In addition to the simple processing of a single audio, DAS can also be used to produce complex audio composed of multiple single audios, generally using functions such as recording, mixing and audio editing in the production of complex audio to achieve this purpose. In addition to using real music, DAW can also add some virtual sound effects to help users create the sound in their head. And DAW has a variety of input sources, it allows one to guitar, piano and other real instrument playing sound input into the computer through the microphone, in order to facilitate subsequent editing or mixing operations. One can use DAW as an omnipotent musical kitchen, in which one can provide music creators with all the raw materials and work for music creation and provide them with platform tools to make a good song. In addition, DAW has a wide range of ways to use it, making it compatible with a variety of musical styles and occasions. DAW allows one to easily complete the production process of a song, from idea to finished product, in the home or studio.

DAW also allows one to collaborate with other musicians and share the projects or files via the web or mobile devices. DAW is a must-have tool for modern music production that allows one to unleash the creativity and skill and realize the musical dreams.

3. Apple Logic Pro X

Logic Pro X Logic Pro is a well-known music production software that stands out for its extremely complex interface (the panel is shown in Fig. 1), which aids the music creation process by incorporating track merging (track stack), instrument layering, an intuitive mixer for plug-in management, and a "score editor." Create the own MIDI tracks using simply a mouse (most apps feature this). It offers a "Virtual drummer" function that includes an interactive drum set for graphically incorporating drums for some fun playing and a natural sound kit [11].

Figure 1. The software interface of APPLE LOGIC PRO X (Photo/Picture credit: Original).

Logic Pro has a sound library and loop collection, as well as some extremely intriguing ready-to-use effects, so it's an excellent choice if one 're searching for some sound for the controller/percussion board. Logic Pro X, which costs $199 on Apple's App Store, is a more extensive version of GarageBand, the music composition tool that comes standard with all Apple computers. Logic Pro X allows one to play a MIDI keyboard in real time with over 100 different tunings. Begin by making a new project and selecting a software instrument. Historical scales must be enabled in Logic Pro X via Preferences/Advanced Tools/Advanced Editing. Select "Project Settings/Tuning" from the File menu to select a specific tuning. Due to the high cost of accessing Internet data, access to free resources on the Internet remains a challenge. Opportunities for formal training in music production are limited. Despite the challenges, music production still takes place using analog and digital resources. Aspiring music producers need to be proactive in exploring the Internet's free resources to gain knowledge about music production [12].

4. Cubase 12

Cubase is the most well-known music production software, and despite increased competition, Cubase still leads the major DAWs [13]. Cubase has many great plugins, a rich sound library, and powerful features that make it worth the money. The only downside to Cubase is that it's a bit expensive and difficult to learn, but if one learns it, it can stay with one for a long time [14]. At the moment, the fundamental music teaching method is relatively backward, and the instruction is boring, which leads to a dramatic loss in student interest and a decrease in teaching efficiency. The use of computer technology introduces new problems and opportunities to basic music education, which considerably stimulates basic music teaching innovation. The goal of this research is to investigate the use of computer technology (ACT) in music instruction in college basic education. This study expounds on the application of ACT in fundamental music instruction from the viewpoints of ear training teaching, music appreciation teaching, and music teaching. On this premise, the study examines the active role of the computer in the application of basic music teaching, which may increase students' interest in basic music teaching, enhance students' learning efficiency, and instructors' teaching quality. The trial results suggest that music composition education has the highest real ACT impact (94.28%), followed by solfeggio and music appreciation teaching (92%). According to the overall study, ACT has achieved some progress in fundamental music education, and its implementation in all aspects is nearly idea [15]. Similar to previous products, Cubase 12 comes in three versions. Pro Pro, Artist and Element editions. Suggested retail prices are $579 for the Cubase Pro 12, $329 for the Cubase Artist 12, and $99.99 for the Cubase Elements 12. The recommended level of this software ranges from semi-professional to expert, not very suitable for beginners

5. Ableton live lite 11

Ableton Live 11 version is one of the best music production software. The best part about it is that it is free to download and compatible with Windows and Mac [15], the panel is shown in Fig. 2. If one uses the paid version, one gets an extra 4GB of sound. If one chooses not to purchase the upgrade, one can get up to eight recordings for free. It also comes with a range of effects and tools to help make high-quality music tracks. One can also use it to add MIDI tools such as keyboards, etc. [16]. If one already knows how a music production program works, one can quickly master it. Ableton is an industrial-grade software that many musicians and producers use to create music and records. Ableton Live is a music production software developed by the Berlin-based Ableton Company for Windows and macOS. Ableton Live, more than any other software, is designed for live performance instruments and for composing, recording, arranging, mixing, and mastering tools. Many famous DJS use Live as their primary authoring and performing tool, as it provides a set of controls for beat matching, fading in and out, and other different effects used by turntable lists.

Figure 2. The software interface of Ableton Live 11 (Photo/Picture credit: Original).

The newly released Ableton Live 11 adds many demanding features, such as an elegant arrangement system and support for MPE (MIDI Polyphonic Expression), as well as new devices and updates to existing devices. It takes Live's modern music cutting-edge technical performance to a new level [17]. The window interface consists of an Arrangement View and a Session View. The Arrangement View provides a horizontal clip timeline similar to regular music production software. The Session View provides a grid-based description of all clips in a live performance. There are four basic instruments, Impulse, Simpler, Instrument Rack and Drum Rack, as well as various types of external expansion instruments. There are a variety of MIDI control devices designed specifically for Live or compatible, such as Akai's APC40 mk II, Novation's Launchpad, and Ableton's own Push. Includes most of the common MIDI and audio effect types in the digital audio field, tailored for electronic music producers and DJS, but also for traditional instrument recording. What's more, it has more comprehensive audio sampling processing functions, including sampling analysis, time stretching, online material, MIDI conversion, etc., to better adapt to the overall needs of the music.

Almost all parameters in Ableton Live 11 can be automated through an envelope, whether it's audio clips, parameter controls for audio devices, or mapping to MIDI controls. And most of the interface is adapted to live performance and production, the user interface rarely has a message or dialog box pop up, one can hide and display some parts at any time based on the arrow.

6. Limitations & Future outlooks

Through the discussion of this study, the existing DAW has the following shortcomings. Firstly, the use of DAW requires certain hardware and software conditions, such as memory, processor, sound card, operating system, etc. If these conditions are not met, the efficiency and stability of DAW may be affected. Secondly, it takes time and effort to learn and master DAW, different DAW have different interfaces and functions, users need to be familiar with and adapt to their operation logic and workflow, which may cause some difficulties and frustration for beginners. Finally, the use of DAW

may lead to some problems in music creation, such as over-reliance on the functions and effects of software, ignoring the essence and creativity of music, or being obsessed with the adjustment of details, ignoring the overall effect and style. The development of DAW will pay more attention to user experience and personalization, such as providing a more friendly and flexible interface, more intelligent and user-friendly functions, and more abundant and diversified resources. In addition, with the further development of science and technology. The development of DAW will make greater use of cloud computing and artificial intelligence technologies, such as providing more efficient and secure data storage and transmission, more accurate and practical music analysis and generation, and more convenient and collaborative music sharing and communication. What's more, the development of DAW will be more integrated with other fields and mediums, such as combining virtual reality and augmented reality technology to provide a more immersive and innovative environment for music production and performance, combining social networks and gaming platforms to provide a more interactive and fun way to learn and entertain music [18].

7. Conclusion

This paper mainly introduces the definition, purpose, function, type and development of DAW, and how to choose the appropriate DAW according to individual needs. This article compares and analyzes three commonly used DAWs (Apple Logic Pro X, Cubase 12, Ableton Live Lite 11) from the aspects of personal budget, user experience, software operating system compatibility, long-term development, and whether live performances are needed. Their advantages, disadvantages and application range are pointed out. This paper also points out some limitations of DAW, such as the requirements of hardware and software conditions, the difficulty of learning and mastering, the problems of music creation, etc., and looks forward to the future development direction of DAW, such as the improvement of user experience and personalization, the utilization of cloud computing and artificial intelligence, and the integration of other fields and media. The research significance of this paper is that it can help independent music producers to understand the basic situation and selection criteria of DAW, so as to better use DAW to create and express their own music ideas, and also provide some reference and inspiration for further improvement and innovation of DAW.

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