Synthesizer_DAW.doc
Dropbox:/Arduino_Synthesizer/Synth_Class/...

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H. Sailer - Digital Audio Workstation Software Synthesizers

I have a website for the Synthesizer class (a rich source of information) at:
http://www.hamptonsailer.com/Synth

MIDI – Musical Instrument Digital Interface

"Musical Instrument Digital Interface" is a technical standard that describes a communication protocol, digital interface, and electrical connectors that connect a wide variety of electronic musical instruments, computers, and related audio devices for playing, editing, and recording music.[1] A single MIDI cable can carry up to sixteen channels of MIDI data, each of which can be routed to a separate device. Each interaction with a key, button, knob or slider is converted into a MIDI event, which specifies musical instructions, such as a note's pitch, timing and velocity. One common MIDI application is to play a MIDI keyboard or other controller and use it to trigger a digital sound module (which contains synthesized musical sounds) to generate sounds, which the audience hears produced by a keyboard amplifier. MIDI data can be transferred via MIDI or USB cable, or recorded to a sequencer or digital audio workstation to be edited or played back.

http://www.hamptonsailer.com/Synth/Class1.php

https://www.songstuff.com/recording/article/midi-message-format/

Free MIDI files

You can find free MIDI files of popular songs on dedicated websites like https://www.bitmidi.com, FreeMidi.org or musescore.com, which host user-created collections. You can also look for "free MIDI packs" from producers and music production sites like WA Production and Cymatics. To find specific songs, search on these sites, or try YouTube by appending ".mid" to the song title.

https://www.waproduction.com/sounds/view/dirty-house-fever
https://www.waproduction.com/sounds/items/free

Copy audio and video tracks from online media with "Wondershare UniConverter".
https://videoconverter.wondershare.net/store/windows-individuals-test.html

https://groovemonkee.com/pages/beat-farm-free-midi-beats

Digital Audio Workstation

In the world of synthetic music, there are two basic approaches one can take to sound generation. First, there are the hardware implementations of analog and digital synthesizers (similar to an electronic organ). Secondly, one could create a virtual musical instrument, by running some software on a PC. At its most basic level a DAW software program can behave like a multi-track recorder. In addition, DAW software can also play back sound samples, read and write MIDI files and create synth sounds from scratch. There are usually a plethora of sound effects included, like reverb, etc.

Computer-based DAWs have extensive recording, editing, and playback capabilities (and some also have video-related features). For example, they can provide a practically limitless number of tracks to record on, polyphony, and virtual synthesizers or sample-based instruments to use for recording music. DAWs can also provide a wide variety of effects, such as reverb, to enhance or change the sounds themselves.

As software systems, DAWs are designed with many user interfaces, but generally, they are based on a multitrack tape recorder metaphor, making it easier for recording engineers and musicians already familiar with using tape recorders to become familiar with the new systems. Therefore, computer-based DAWs tend to have a standard layout that includes transport controls (play, rewind, record, etc.), track controls and a mixer. There is often a window that contains a “Piano Scroll” layout, which allows you to assign notes to time slots, much like a player piano scroll of paper.

Single-track DAWs display only one (mono or stereo form) track at a time.[a] Multitrack DAWs support operations on multiple tracks at once. Like a mixing console, each track typically has controls that allow the user to adjust the gain, equalization and stereo panning of the sound on each track. In a traditional recording studio additional rackmount processing gear is physically plugged into the audio signal path to add reverb, compression, etc. However, a DAW can also route in software or use audio plug-ins (for example, a VST plugin) to process the sound on a track.

Perhaps the most significant feature available from a DAW that is not available in analog recording is the ability to undo a previous action, using a command similar to that of the undo function in word processing software. Undo makes it much easier to avoid accidentally permanently erasing or recording over a previous recording. If a mistake or unwanted change is made, the undo command is used to conveniently revert the changed data to a previous state. Cut, Copy, Paste, and Undo are familiar and common computer commands and they are usually available in DAWs in some form. More common functions include the modifications of several factors concerning a sound. These include wave shape, pitch, tempo, and filtering.

Free DAW software

There are many free DAW software packages, some are very comprehensive and not junk at all. Here are just a few (likely more popular packages),

https://www.tracktion.com/products/waveform-free

https://www.avid.com/pro-tools/intro

https://www.uaudio.com/products/luna needs Asio audio driver, Google it.

https://helpcenter.steinberg.de/hc/en-us/articles/17863730844946-Steinberg-built-in-ASIO-Driver-information-download

https://www.cakewalk.com/sonar Free and paid both available.

https://www.audacityteam.org/ Simple multi-track recorder/player

Purchased DAW software packages

My favorite is Ableton Live (Lite). It has a unique feature to play short clips, triggered by the press of a button on a Launch Pad. This allows on the fly music composition, much as a DJ might add effects to a standard song.

https://www.ableton.com/en/live/

https://www.image-line.com/fl-studio/buy-now/

https://www.sweetwater.com/c699--DAW_Software?all

Learn to read Sheet Music

One very valuable skill would be to read sheet music. In the world of music publishing, there are many books and sheets of music written on a musical staff. If you want to play a keyboard instrument, being able to read sheet music will allow you to instantly play written music.

https://moises.ai/blog/tips/how-to-read-sheet-music/

https://www.steinberg.net/dorico/ PC software to create and play sheet music

DAW plugin(s) - Virtual Studio Technology

Plugin(s) allow a basic DAW package to be extended, by adding new instruments and sound effects. https://en.wikipedia.org/wiki/Virtual_Studio_Technology

Virtual Studio Technology DLL (VST) plugin support gives producers access to thousands of additional tools and effects

Supports almost all audio and music file formats including MP3, WAV, VOX, GSM, WMA, AU (Apple), AIF, FLAC, real audio, OGG, AAC, M4A, MID, AMR and VST.

Beat packs

Just like MIDI files that contain whole songs, there are clips of MIDI commands to play beats of drums or other instruments.

https://web.unison.audio/midi-chord-pack-2 Beat pack MIDI files, purchase.

https://serato.com/studio Beat maker

https://serato.com/dj/hardware DJ hardware and software

Basic Music theory

A music composition can be divided up into individual beats, measures (repetitive collection of beats), movements (each movement possibly at a different temp) (a group of related measures) and an overall song. The Ableton live DAW has a piano scroll that is divided up into beats, measures and an overall composition.

https://en.wikipedia.org/wiki/Music_theory

Ableton Live software – User tutorial

Ableton Live software comes included with the purchase of Akai APC Key 25 MK2 Keyboard for $100 dollars. But the Live software is very sophisticated and somewhat daunting to learn. However, the design of "session view" makes Live an excellent choice for live performances. You can map any of the Live software controls to a Midi Keyboard's physical controls. There are many tutorials on YouTube, and Ableton has reference and training material on their website.

https://www.ableton.com/en/manual/welcome-to-live

Session view:

The top of the screen has a menu bar, for familiar operations like file storage, file retrieval, view settings, options and so on.
Under the top menu bar, is a set of icons to control how live plays most elements. You can control the speed of beats per minute, start and stop playback, and many other functions.

The main screen is divided up into four quadrants. I you are not sure if you are in session mode, there is an icon set in the upper right hand corner. Make sure the vertical bars are highlighted.

Browser window

The upper left window has a browser for many of the resources you can call upon. Things like Midi clips, sounds, synthesizer voices, audio files, and so on. If you double click on a sound, there is a short playback of the sound. You will see a time graph of the amplitude of a selected sound, under the browser window.

Track recording

The upper right hand side of the window has columns for recording and playing tracks of Midi or audio clips. When using a Midi track, be aware it will not make any sound, until you install a voice resource. Go to the browsing window and choose a sound, then click and drag to the title bar of the session track. When you then click on a track clip playback button (under the track title block), a Piano Scroll will appear in the bottom right window. You can now edit your music creation in the Piano Scroll window by double clicking spaces on the scroll.

The real beauty of track clips, is that they can be slaved to buttons on your Midi controller. To enter the associate mode (map controls to Live functions)

1. Turn MIDI map mode on: Mac: CMD + m, Windows: Ctrl + m.
2. Select the software function you want to map, e.g. a volume fader.
3. Then move a knob or slider on your MIDI controller.
4. The controls are now mapped.
5. Repeat for the remaining controls you want to map.
6. Exit MIDI map mode.

Piano Scroll window

This is the main edit window for selecting and playing notes. The piano scroll will play the notes you record, when any clip bar of the Track is selected. First start by double clicking any note and time space, to install a struck note. Double click again to remove. Scroll up and down by grabbing the left hand window with the letters of the keyboard notes. Make sure the little blue icon to the left of the Piano scroll is selected, this allows you to monitor the sounds as you play.

Sound adjustments

There are sound modification adjustments in the lower left hand corner.