A Modular System
for the Modern Composer

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A Modular System

for the Modern Composer

by Allison Reitz

[abstract]

This thesis supports a modular system for the modern composer. The necessary expanse of a modern composer's expertise is outlined, as well the nature and need for a workflow that is efficient and intuitive. A brief history of the beginning of modularity in audio and music is provided, as well as an investigation of modern software developments that utilize the concept of modularity. Modular and non-modular workflows used by successful composers are explored in order to examine the benefits of a Pro Tools-based modular system.

The thesis finally describes an example of our suggested modular system as well as the accompanying *Modular System Handbook,* and elaborates on the need for a comprehensive handbook that includes instructions on *connectivity* in addition to guides for involved applications.

A Modular System
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[introduction]

- the modern composer's workflow -

The modern composer is a complex entity, proficient in a multitude of skillsets and able to capitalize on the potential waiting at their intersections. Most modern composers assume an unusual amount of identities; at our most basic level – as a *composer*, we draw upon knowledge of music theory, orchestration, instrumentation, etc. We've probably mastered at least one musical instrument, making us a *musician*, and our experience playing that instrument in ensembles gives us the awareness of a *conductor* we need to write realistic parts for any instrument. Of course, we end up with the recording equipment to record our instruments and a space with (hopefully) the full capabilities of a recording studio; now the composer is a *recording engineer*. To make this happen, we assemble our studio equipment and its connections and wiring, and we're doing the job of an *audio engineer*. To create sounds much larger than our means, we use sample libraries and their players, and we are *programmers* when we control their parameters with custom interfaces we've created to save time. Inside and outside of our Digital Audio Workstations (DAWs), we finagle a complex world of synthesis, signal processing and signal flow, a repertoire blatantly parallel to that of a *sound*

designer. When the music is complete, we *mix* and send along a high-quality product, complete with balanced levels, delicate reverbs and delays.

It truly requires an incredible *analytical mind* to command each and all of these technical pieces. However, it is important to keep in mind throughout this text that these myriad things are simply tools invented to aid in the pursuit of a loftier goal. Music! No matter how much time is spent tinkering, typing, configuring or studying, the magic of music is unfathomable. This is our *creative mind*, the connection to our soul, where the magical influence of music is encountered and experienced, and in some of us, begins. The exploration and compilation of information assembled in this text, as well as its accompanying *Modular System Handbook* and tutorial videos, is simply meant to bring the composer any number of steps closer to music. The goal, as it has always been, is *transparency* – to bring down the wall of technology that separates the composer from the magic of music.

For this reason, it is extremely important for a composer's process to be as transparent as possible. With so many skillsets demanding constant troubleshooting and invention, *music* and our *creative mind* can become very difficult to reach. Composers need a smooth system that keeps their minds free from routine tinkering and facilitates the magic of musical creation.

Working toward transparency, composers have come up with their own methods of harnessing the new complexity of the craft in a way that facilitates the flow of their creative minds. We will call their solutions *workflows*. This text and its accompanying *Modular System Handbook* and tutorial videos were created to provide modern composers with the simplest, fastest workflow solution – a *Modular Workflow*.

Composers have expanded their skillsets because the music and film industries have come to expect an incredible amount from them. From the speedy creation of believable MIDI mockups to the practicality of printing parts for a recording session, technology is a crucial tool, helping the modern composer meet these huge expectations.

Fortunately and unfortunately, technology continues to evolve and progress at an amazing rate, leaving software users scrambling to find answers to their technological questions. Software manuals are comprehensive, but most seem intimidating, and only rarely provide useful information on connectivity and communication *between* programs. Therefore most reference material now comes in the form of online forums, where we struggle to glean an answer to our specific question from an unprofessional answer to someone else's slightly similar question that was posted three years ago.

Seeking to rectify this imbalance, the *Modular System Handbook* provides the literal missing links between software programs and hardware that facilitate a modern workflow. The Handbook proposes the use of a modular workflow to save time and effort while we are in the "zone".

[the modular system]

- the beginning: modular synthesizers -

Something is *modular* when it uses *modules* as the basis for its design, and it logically follows that a *module* is one of a set of parts that comprise a modular structure (Oxford, "Module"; Oxford, "Modular").   The idea of modularity is broad, and is a structural concept used in many fields outside that of music or audio in areas such as electrical systems, architecture, business structure, etc. Modularity is also often found in nature, for instance in the structure of a molecule. In the audio world, modularity has a rich history, especially in the realm of analog modular synthesizers. These were one of the first types of synthesizers, bringing modular synthesis into the audio world. In his MIT lecture on the history of modular synthesis, professor Christopher Ariza speculates on the nature of the modular system and its ability to transform existing technologies into more capable systems:

> There wasn't anything shockingly new about the technologies used in the modular synthesizer. Again, they were technologies that had been around for ten or twenty years, but really the interface and the design and the integration of these components in my view was the really important thing. (Ariza, "Modular Synthesizers")
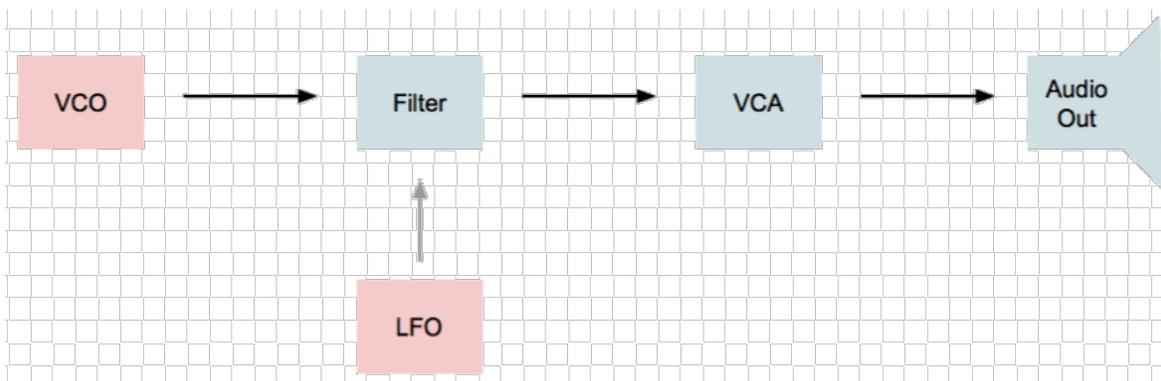

Figure 1 - Modular Synthesizer Diagram

Figure 1 shows a diagram of the modules and connections in a simple modular synthesizer. The modular synthesizer's modules are connected by audio signals and voltage control signals in a modifiable signal flow. This is the ancestor of switchable I/O settings in a DAW – a digital representation of modern modularity; the modular system is still very relevant!
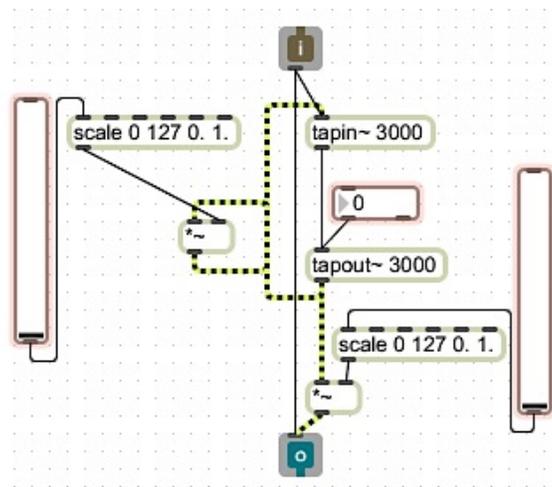
- modularity in developing technology -

Figure 2 - Max/MSP Delay Patch

Software developers and hardware engineers are continually developing and honing technology specifically designed for the needs of composers and sound designers. Much of this software utilizes modularity as a fundamental framework. This is especially evident in visual programming software programs such as Max/MSP and Bidule, that use pre-programmed modules as building blocks for custom patches to create an unlimited amount of functionalities. Figure 2 shows an example of a simple delay patch in Max/MSP, with specialized modules working together to create a variable delay. These modules can do any number of tasks, including outputting data

according to the position of the "slider", scaling data to a specified range, or multiplying an incoming audio signal with incoming control data in real time.

Modularity can also be found on the macro level, with the use of multiple applications in a composer's workflow. Relatively new technologies such as WiFi, Bluetooth, OSC, and digital data "wiring" between programs such as IAC Busses and Soundflower now allow us to use applications modularly, opening up even more possibilities.

[other workflows]

- successful systems -

The modular system outlined in the *Modular System Handbook* uses Pro Tools as its exclusive DAW. However, other DAWs such as Logic Pro, Digital Performer and Cubase are currently also being used successfully in the film music industry. A great example of a very successful workflow that is not modular is, of course, Hans Zimmer's system.

Zimmer uses Cubase as his DAW of choice for a few reasons, which he outlined in an interview with Steinberg after completing his score for *Inception*: the Cubase system has never crashed on him; Cubase can handle a huge number of tracks; and Cubase does not add color to the sound. Zimmer creates all non-orchestral sounds from scratch, so this last point is crucial; however, in the interview Zimmer does not mention Pro Tools, which also has a reputation for clear audio representation. Zimmer's

workflow is not expressly modular, but neither is it template-based – Zimmer spends

months on each project creating his sounds (or modules) from scratch.

Part of the composer's dilemma when deciding on a workflow comes from the

existence of numerous possible ways to achieve each small task. For instance, our

modular setup involves recording MIDI data for dynamics and expression parameters,

whereas Hans' workflow uses Cubase's Expression Mapping. Zimmer applauds VST

Expression Maps in Cubase because they emulate the simple instructions used for

centuries in traditional music notation. Expression maps allow the composer to add

directions for dynamics and expression after recording the MIDI data, enabling the

composer to control multiple expression parameters at once within the expression map

(Walden, "VST Expression"). This can also be achieved in our modular setup, however,

through MIDI mapping to a custom interface for any sample library used in Pro Tools.

Zimmer avoids using sample libraries because of their redundancy, but Hans'

system is similar to our modular system because it also involves a custom MIDI

interface, which he's been using since at least 2007. In spite of his build-from-scratch

system, Zimmer still finds ways to take advantage of the concept of modularity through

modular synthesizers ("Zimmer's DAW of Choice"; Hurwitz, "Zimmer's Scoring

Collective").

Danny Elfman, another incredibly successful film composer, uses Digital

Performer as his DAW of choice. Digital Performer has many qualities that may just

make it an alternative choice for a modular system's DAW. Elfman's orchestrator, Marc

Mann, explains why Mann and Elfman's workflow involves Digital Performer

exclusively: Marc recounts a situation in which a session with over 300 tracks of audio

working smoothly in Digital Performer was transferred unsuccessfully to Pro Tools for

a final mix. He also praises Digital Performer's "conductor track", which is easily

transferred between sessions without problem – this is something that Pro Tools has trouble with. It is unclear whether or not Elfman's workflow is modular, however interviews and videos suggest that his Digital Performer setup is template-based.

Due to a lack of interviews that involve in-depth discussions about workflow and technical specifics, little information about the workflows of most successful composers exists. Research on less prominent composers who are more open about their workflows shows a majority of template-based setups in which all potentially used tracks are loaded, and the composer works from these tracks without having to bring anything new into the session. This strategy shows merit in its ease and speed of use. However, the template-based method suffers from a cluttered workspace, with too many tracks to search through, and uses unnecessary CPU power to run so many tracks simultaneously.

[why the modern composer's modular system works]

- successful modular composers -

The template-based system is popular with established composers who have been using their workflows for many years. Up-and-coming composers, however, are familiar with the newest technology, whose capabilities lead them to explore new functionalities and workflows. This new technology opens up a huge amount of options and configurations that simply weren't possible before they were developed.

When used to their fullest potential, these technologies can enhance a composer's workflow and save valuable time loading and configuring.

Judson Crane, a composer for media in Los Angeles, CA, has been cultivating a modular workflow to save him time and energy. This new workflow gives him the speed he needs to meet the expectations of his clients. Crane begins with a blank slate in Pro Tools – a template that only includes pre-routed printing stems. He then uses a custom iPad interface to call up track presets that are pre-configured to automatically load with the desired I/O settings and MIDI assignments for sample library control parameters.

Joe Trapanese is an up-and-coming film composer known for his scores for films such as *Oblivion* and *Tron*. Trapanese had used Logic Pro as his main DAW for the majority of his composing career, and has recently decided to switch to Pro Tools as his main DAW, to take advantage of its huge array of functionalities. Trapanese is currently having a modular system and custom iPad interface designed for use as his new workflow.

- modular magic –

The modular system consists of four applications working modularly, on the macro level. The system uses Pro Tools as the main DAW and a customized iPad interface created with the Lemur iPad application. The interface connects with the main Operating System through OSCulator, an application that receives OSC data, interprets the data according to customizable specifications, and sends it along to any other application on the computer that is able to receive MIDI or OSC data. In our modular system, Pro Tools receives data from OSCulator, as does an application called Keyboard

Maestro. Keyboard Maestro receives MIDI data from OSCulator as triggers for configurable chains of events called *macros*. In this way, with just the touch of a button on the iPad interface, a composer can perform tasks that would ordinarily require sequences of actions or series' of complicated keyboard shortcuts.

Our modular system's *modules* literally pieces of the whole, brought in as pieces of what would have been a template, but now contains only the Pro Tools tracks that are desired for the specific project at hand. These pieces come in the form of a unique Pro Tools feature called *track presets*, which are tracks that can be configured and saved either individually, or as a group. In this way, a Keyboard Maestro macro can be triggered by the iPad interface to set in motion the series of keyboard shortcuts required to call up a specific track preset. The preset is loaded in its pre-configured glory. This allows the composer to continue focusing on the creative mind, rather than having to configure and troubleshoot, just when a new idea forms and a new instrument or plugin is needed.

[conclusion]

- the *Modular System Handbook* -

The *Modular System Handbook* is meant to enable the composer to create this modular setup for his or her studio. The Handbook is a nearly comprehensive compilation of current relevant software, useful combinations thereof, and suggestions for options for communication between these programs. Basic operation of software is

covered, and step-by-step instructions are provided in the Handbook as well as its accompanying tutorial videos.

The Handbook attempts to organize all relevant information in one place, and to present it precisely and clearly, so that composers can quickly find the material they seek and move on to more creative endeavors. The information is easily navigable and as comprehensive as possible. With the use of this compilation of resources, composers will spend less time fixing and more time composing.

As explored above, this information is significant! Software developers and hardware engineers are continually developing and honing technology specifically designed for the needs of composers and sound designers. The goal is very near: an almost completely transparent workflow that allows the composer to let creativity flow without the hindrance of technological tinkering. Composers who understand the technology they use *and its potential* can provide valuable feedback to developers, engaging an ongoing creative conversation that leads to unimaginable technological advances. This Handbook seeks to enable the modern composer to do just that – not only to use the modular system for its speed and efficiency, but to *understand* its working parts. This allows the composer to modify, update, overhaul, and improve the system as technology develops and leads to a better workflow for all composers.

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