

Tileyard Education

M.A Commercial Music Producer

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Introduction:

This document discusses the research and production elements for the *Kalimba*, a sample instrument built using the KSP programming language developed for *Kontakt* version 5 and above.

As a creative, I remembered discovering Sampling back in 2010 after watching a series of YouTube videos of *Peter Howell (BBC Radiophonic Workshop)* both writing & producing the theme tune for *Doctor Who* and excerpts of him on *Blue Peter* discussing a very early computer-based *sampler* around (circa 1980). In my own time during the years since, I often have taken the time to sample elements in records I have liked, in addition to exploring more technical ways of sampling such as ways to separate (and then sample) elements such as Kick drums from existing records.

Objectives & Success Criteria for the Instrument

The *original* objective of the instrument was to authentically capture, sample & replay an authentic Kalimba; for use in a recording/production environment.

My original development thoughts were to create a 2x octaves of a sampled Kalimba with scripted *Reverb* and *Delay* controls, a simple user interface & an accompanying graphic.

My success criteria of the project throughout was measured throughout the process using the following criterias/means tests:

- *Does the Instrument function as expected (i.e all keys correctly mapped w/ correct velocities)?*
- *Does the instrument function on multiple system(s) (i.e do the resource containers map correctly when file paths are changed/edited)?*
- *Does the instrument load correctly inside of the host application (Kontakt 5 & above)?*
- *Are file sizes complicit/in-keeping with alternative sample instruments using similar sample sizes & formats (e.g .WAV)?*
- *Are performers able to use the instrument in a live, production environment (i.e no crashes, incorrectly configured parameters (ref. Objective i)?*
- *Does the Instrument satisfy the objective of the branding tagline as being “**The Musician’s Friend**”?*

Further to user feedback (discussed in later sections), the product was highly aided by the feedback received, allowing for further expandability. Thus, the following *additional success criterias* were subsequently added as the project progressed:

- *Was user feedback accounted for (and subsequently incorporated) into design & build stages (from Version 1 to “Golden Master” (**referred hereafter as GM/G.M**)?)*;
- *Do all “Round Robin(s)” function as expected?;*
- *Is the “Round Robin” function randomized (50/50) odds?;*
- *Does the out-of-box experience (**referred hereafter as OOB**)/configuration work as expected (i.e do all backgrounds & control knobs load)?;*
- *Does loading the default OOB ensure that all default parameters are reset to default? (i.e no odd/unexpected parameters left from development testing)?;*
- *Are all additional (“under-the-hood”) customisation features set to default (Modulation/Pitch)?;*
- *If added to the Kontakt Library, do “Batch re-saves” cause any instability to the sampler instrument?*

Selection of a Host application:

Native Instruments, *Kontakt* was selected as my choice for approaching the task (given its market monopoly as one of the *industry standard* choices for sampling & manipulating both inside a DAW & as an individual (self-hosted) application).

An additional favorable point (both to myself as the programmer and inevitably to the end user) was the high-degree of *customizability* *Kontakt* has to further build-upon (w/ the insertion of additional FX & slicing capabilities).

Additionally, comparing my software choice to others (e.g *Reaktor*, also from *Native Instruments*) It's inability to create a custom background without modification of .plist/source files on macOS (creating possible system instability) further clarified that my choice of host application was the right one for me.

The reliance of scripting to achieve the desired result (using the *KSP* language) did not hinder my selection given my existing programming experience.

The strong *community support* for the language via Native Instruments' own forums allowed me to execute the task in confidence knowing any issues I may have had would be able to be solved relatively quickly.

Introduction to Instrument & Featureset:

NB: The instrument explained in this section explicitly refers to the GM Build. The design iterations & changelog elements are explained in a subsequent section.

Appendix i) Defining a GM Build - “Golden master is the final version of software development, succeeding alpha, beta or other software development versions. Typically, the golden master doesn’t require any further programming or testing and can be readily used. However, digital signing might be required to ensure the software's integrity and authenticity.” (**TechnoPedia, NA**)

The GM Build of the *Kalimba* incorporates the following design & functional elements:

Design:

- A simple OOB experience with default-set on-screen parameters controlling *Reverb* and *Delay*
- A customisable *advanced* section (Kontakt default)
- An on-screen, vector graphic clearly illustrating the sampled instrument

Functional Elements:

- Three mapped keyzones split into sections:
 - I) 2x playable octaves of an authentically sampled Kalimba
 - II) 2x playable octaves of an authentically sampled Kalimba (w/ Distortion)
 - III) 1x Rhythmically sampled Kalimba with pre-produced arpeggiated effects
- Inclusion of “Round Robin(s)” for performance variety in both performance & recording
- Modulated Pitch effects for optional creativity & variety (via *Bypass* user toggle key switch)

Investigating a need:

The task briefs reference a need for a draft marketing/branding proposal to additionally be completed for the instrument. Whilst this is not explored in any high degree of detail within this document, the choice of Instrument (and marketability) was an integral aspect of consideration at this pre-production stage. Thus, market research was completed in order to develop an instrument that both:

- Satisfied the assessment brief criteria;
- Commercially marketable in a “real-world” use case

The concluded research drew the following conclusions:

The impact of COVID-19 on Music-industry Stakeholders:

One of the research elements explored included the ongoing COVID-19 pandemic & the impact both the virus (and subsequent UK Government lockdowns) had on stakeholders in the Music industry. A key area of specific exploration was the impossibility for many musicians to continue using Studios and have access to instruments during this period.

Temporarily gone were the days where musicians had access to Studio *backline* Instruments & facilities; and instead Producers were “limited” to in-the-box software instruments and effects. These circumstances are still the case for many, due to the impact the Virus is still continually having to this day. Many, (myself included) fell victim to having to “*Shield*” for exceptionally long periods of time and had to source reputable replacements for equipment & instruments.

“Abbey Road’s closure is emblematic of the near-total halt in activity across the music industry. Geoff Taylor, chief executive of the BPI (British Phonographic Industry), says that, before the pandemic, the nation’s music industry remained the world’s most successful exporter of music after the US and had been “reporting a strong performance in 2019, with revenues rising 7.3 per cent, the fourth successive year of growth”.

But this spring’s growth has been nipped in the bud. “The most profound effects of the virus on the music industry have been cessation of all live performances and gigs, recording sessions and video shoots,” says Taylor. “This puts at immediate risk the livelihoods of thousands of musicians and other self-employed workers in music and across the creative industries more widely. We are very concerned about the impact on artists, venues and freelancers right across the music business. According to UK Music, which represents the whole music industry including the live sector, around 72 per cent of those who ~~are~~ work in the music industry are self-employed.” (Brown, Helen (The Independent) | Taylor, Geoff, 2020)

NB: Strikethrough added to incorrect word addition.

The produced *Kalimba* instrument aids those who may need a reputable, accurate 1:1 replica of the instrument and removes the need for stakeholders to both travel to Studios or buy the physical instrument.

Alternatives to the “Kalimba”/“Exploring the “Time:Money” ratio”:

An obvious point of exploration when comparing the *Kalimba* to other market offerings was researching & comparing the *current* market choices. The research concluded produced the following results:

Existing Software:

- There are already existing **VST’s** on the market for a Kalimba Instrument;
- The aforementioned VST’s do not work with Avid *Pro Tools*;
- There are already Kontakt-compatible Kalimba instruments on the market (*Pro Tools compatible*)
- Pricing for digital Kalimba Instruments vary from \$39 to \$299

Example I: EastWest Quantum Leap RA (\$299)

- *The software comes as part of a package, rather than an individual instrument.*
- *Marketability as a software group/package makes it unaffordable for beginner to intermediate producers.*

Example II: Cinematique Instrument Glockenspiel Box (\$55)

- *The software comes as part of a package, rather than an individual instrument.*
- *The instrument is combined with a Piano. It is not possible (according to marketing blurb) to remove the Piano element to isolate the Kalimba.*

Example III: Orange Tree Sample - Grand Kalimba (\$39)

- *An individual instrument, with great control parameters:*

“You can adjust settings for each individual tine, instead of for the instrument as a whole. Detuning just a few ti(m)es a little bit for example can help the instrument sound more natural.

You can adjust the likelihood that the kalimba will buzz, which is a natural occurrence when playing a real kalimba.

You can adjust the distance between the microphone recording the kalimba, and the kalimba itself.

Double the tines – playing two tines for each note (creating a chorus or spacey effect. I find this particularly useful for lo-fi, hip-hop, or psychedelic music.) The one downside to this library is the UI could be improved in my opinion... there is definitely enough space to lay out more without having to use dropdown menus. Still, this VST sounds great!”

(Musical Sanctuary, 2021)

*NB: Corrected misspelling in **bold**.*

Alternative Sample Sources/DIY Approach:

Splice is a common source of samples available for a monthly fee (\$9.99 and above). Querying a search result within the software resulted in a detailed list of both *one-shot* and *melodic loop* samples being displayed.

It is undisputed that using the *Splice* service would allow customers of the service to produce their own version of the *Kalimba* at a **production cost** of zero. However, the viability of this would depend on the Time:Money ratio, explored below.

Exploring the Time:Money ratio:

A common phrase mentioned throughout all walks of life is: “*Time is money*”. Assessing this quote in detail raises the dilemma (in this case) of cost saving (by producing your own sampler) versus buying a pre-made/coded version from a manufacturer.

In a production environment (especially when charging *per-hour*), it is necessary for Musicians & Producers to have the tools needed on-hand and *quickly*. The *Kalimba* addresses this objective by its lightweight file-size (as a package), quick loading times (with or without a batch re-save) and authentic sound quality.

Marketing Positioning of the “Kalimba”

The research concluded (accounting for both market/environmental factors) that there is a market and demand for sample instruments (more so than ever before). Thus, the *Kalimba* does have both a *place* and *purpose* as a commercial product.

The success of the project commercially would depend highly on effective marketing/possible extension strategies to the product life cycle (depending on customer demand, reviews and feedback).

Main Research Elements for the “Kalimba”.

Subsection I: “What is a Sampler”:

A sampler, in ultra-simplistic terms, is basically a glorified tape recorder. Used primarily in electronic music, the sampler allows music to be made out of any sound recorded by the user, rather than relying on tones generated by oscillators, computer chips, white noise or other synthesi(z)er technology. (McNamee / “The Guardian”, 2009)

Originally developed in the 1920’s as a Technology in it’s own right, Sampling (and accompanying “*Sampling Techniques*”) have improved exponentially during it’s (current) 100-year lifespan and allow for audio to be captured (via an analogue:digital conversion) and then into a piece of hardware to either capture, edit or manipulate.

Subsection II: “How can a Sampler be used?”

A sampler can/may be used in a multitude of ways; and many of them are determined strictly by the creativity of the operator/producer.

Most notable ways of ways of sampling are:

- “Recording instruments to playback digitally (i.e the *Kalimba*)
- Capturing Vocals (to either *Chop* or change)
- Capturing rhythmic patterns (i.e *Drums*) to either play back as whole-loops;
- ...or (using more modern equipment): *chopping* and *combining* samples, to create new rhythmic or melodic patterns” (MusicProductionNerds, N.A - *Static Page*)

Subsection III: Features of a Sampler:

Product features can (and may) be explored on two levels:

- A *Physical* Sampler (e.g *AKAI MPC*)
- A *Software* Sampler (e.g *Native Instruments, Kontakt*)

Whilst the sample instrument is based around a *Software* sampler, it was necessary to familiarize myself with all *possible* features of both versions:

Common sampler features are described as a device that: “uses sound recordings (or “samples”) of real instrument sounds (e.g., a piano, violin or trumpet), excerpts from recorded songs (e.g., a five-second bass guitar riff from a funk song) or found sounds (e.g., sirens and ocean waves)” (Wikipedia, 2005)

Subsection IV: *Advantages of Kontakt versus other market offerings:*

In previous subsections, the *market* research/mapping for the *Kalimba* was briefly discussed; however, in continuation; the host software provides the freedom for the end-user to use the product both *live* or in a *Studio* session.

In later iterations of Native Instruments’ own product: *Komplete Kontrol* - the integration of this software with *Kontakt* and specifically, the *Kalimba* creates further performance opportunities. “*The best thing about the whole Komplete Kontrol/NKS concept, though, is the automatic*

mapping of plugin parameters to the A-Series' eight knobs, across an unlimited number of button-accessed pages. " (Computer Music, 2018)

Subsection V: Introduction to the KSP ("Kontakt Script Processor") Programming Language (and the limitations thereof):

A necessary addition to the *Kalimba* was the addition of user-tweakable control parameters and a clean user interface. The success of this criteria (ref. aforementioned *Objectives & Success Criteria*) was dependent on the utilization of the KSP language to achieve these goals.

As an existing programmer, the language was fairly easy to digest and understand given my previous background experience. However, as referenced by User "YummyBeats" on his own forum - the language is described as: *"It is very easy to dive in quickly and create basic instruments. The difficult part is not the language itself which is really not that complex. The difficulty lies in writing many many parts on our own since there are not many premade functions or libraries available."* (YummyBeats, 2020)

The (practically) non-existence of any pre-made libraries both made the writing/scripting process more difficult; yet creative.

Discussed in later sections further references the design elements in more detail; however as part of the research stages it was integral to familiarize myself with the features of the language and how I may be able to utilize the syntax commands to achieve my concept for a proposed design.

I was fortunate that the KSP scripting language allowed for 'call' features (aka *"to bring an object forward" for use*). In this instance, I was able to "Call" a background image to appear on-screen, in which I was then able to layer knobs & control wheels on top of, to achieve one of my function success criterias.

Design & Build Iterations:

For the *Kalimba*, I did not opt to create a proof-of-concept design. Instead, throughout my design/programming iterations, I opted to produce a series of *Beta* builds, in order to gauge stability & user feedback. A changelog of iterations are listed below:

Appendix I - Pre-Production | Recording of Kalimba Instrument:

- A “Pro Tools” session was created & 2x RODE NT 1:A Microphones were set up (in an X:Y configuration) to record 2x sample takes of the Kalimba;
- The audio was captured into Pro Tools (w/ each note on a separate channel);
- 2x velocity takes were captured (1x ‘soft’, 1x ‘hard’)
- The ‘clips’ were rendered to a directory ready for import into a new, blank Kontakt instrument.

Appendix II - Beta 1: Creation of Kontakt Instrument:

- The ‘clips’ were imported into Kontakt & set chromatically to each note. Velocities were set as follows: **Soft: 0-63 | Hard: 64-127**;
- A “Resource” container was created to allow for a GUI to be built & additional customisable parameters coded;
- I opted to use Photoshop & Google Images to create a set canvas size & background color. I sourced a vector graphic of a Kalimba to additionally add as a further layer.
- I sourced some control-knobs to package into the resource container, for later definition as a variable inside of KSP;
- I defined the buttons within KSP (e.g \$control_1) as a callable variable;
- I added the desired control FX into the “InsertFX” within Kontakt (Reverb + Delay);
- I programmed the desired control elements to “call” upon specific parameters within Kontakt (Wet:Dry toggle);
- I tested that these functions worked as expected before submitting for user feedback.

User Feedback (Beta 1)

- User feedback reported that the function of the instrument was good;
- User feedback reported that some additional key zones and “round-robins” may be beneficial;

Appendix II - Beta 2: Incorporation of suggestions:

- Additional key zones were added (1x distorted Kalimba, 1x Rhythmic variation) | NB: These FX were added separately and re-imported (versus using Kontakt’s FX);
- The additional 1x take of the Kalimba was imported as a secondary group in Kontakt and built to call at a rate of 50:50. This provided more of a ‘real’ playing experience for the end-user;
- Functions were then re-submitted & recorded video sent as a demo to additional users.

User Feedback (Beta 2)

- *User feedback reported that: "...Sounding good", "it's pretty much there as a usable product" and "...It would be nice to see you push this a little further and get a little experimental.... ...how about adding some modulated pitch/delay effects so that you can make some unique sounds" (Robinson, C, 2022);*
- *User feedback reported that: "I really like this. The sounds are great and it's something that I'd use in my projects" (Potts, P, 2022)*

Appendix III - Beta 3: GM Build + Incorporation of suggestions:

- *As-per user feedback, a "Modulation" feature was added with a configurable pitch envelope. Although hidden & disabled (by default) as part of the OOB, a default configuration was provided for those wishing to utilize, satisfying user feedback suggestions*
- *A final test phase was entered into, assessing the factors referenced in "Objectives & Success Criteria;*
- *The instrument passed all internal testing/verification methods & has now been submitted for final external feedback. Upon validation, the product is retail-ready.*

Further considerations:

Referenced above are the design & featureset improvements to the sampler instrument. Further considerations have already been contemplated in terms of creating a *LTSB* ("*Long Term Support Branch*") product (i.e updates spanning several months; despite being a retail product).

Such considerations include: Re-designing of the user interface, focusing on more neutral colors (black & white), changing the *Kalimba* graphic to additionally be black & white to create more brand uniformity & adding further control parameters to the "basic" OOB, rather than using Kontakt's own "*under the hood*" approach for editing more advanced parameters.

Conclusion

It is clear that the instrument created is a product “*fit for purpose*” and satisfies both internal (self-set) and external (examining) success criterias. The plans for medium-long term improvements combined with additional branding considerations place the product in a category suitable for commercial release.

It would be beneficial for the suggestions (i.e user interface enhancement & bringing “*backend*” features to the custom user interface) to be incorporated to *further* strengthen and aid the brand development; yet the instrument as an *individual* product stands well on its own. I also believe that the instrument bears a strong reference to the brand tagline of being “***The Musician's Friend***” as a toolbox of function, versatility & variety.

In my opinion, I found that my previous skills as a programmer (contained within a previous job role of a *System Administrator*) highly aided my proficiency in learning a new programming language to achieve the desired results. It also allowed me to explore the prospects of becoming a developer for sample library companies (e.g *Splitfire Audio*) (however, subject to additional training/revision!).

The feedback received throughout all stages of the development process highly aided the success of the product in its current/working state. Being able to discuss the product/concept with other industry stakeholders/professionals allowed for unbiased opinions to be expressed and realistic solutions to be incorporated to achieve the end goal. What was (originally) destined to be a *simple* (in comparison) product of a basic, two octave Kalimba turned into a multi-octave, multi-featured, highly customisable product. All thanks to user feedback.

If approaching the task again, I would have considered more favorably producing a sketch design concept, either on paper or using CAD software (e.g *Adobe Indesign*) to create mock concepts whilst also developing some of the graphical elements “*in-house*”.

The task clarified the importance of both pre-production and organization. Building different elements concurrently during one programming session (across 3-4 different pieces of software (*Pro Tools (inc. Kontakt), Photoshop, Logic & Chrome*)) on a single monitor reiterated the importance of strategic planning and more evenly distributing the workload.

I enjoyed creating a product that I am both proud of and have found to be functional for the purposes it's designed to serve. I aim to use the instrument in my own creations and have considered incorporating the proposed *LTSB* business model into developing the *Kalimba* (and other instruments) over time post-graduation.

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