

UNIVERSITY OF LEIPZIG
Faculty of Mathematics and Computer Science
Department of Computer Science

Programming a Realtime Audio Synthesizer in Rust

*Implementing an OSC capable audio synthesizer with low
hardware requirements*

Master's Thesis

Supervisor

Prof. Dr. Mario Hlawtischka

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Submitted by **Andreas Linz** to the *Department of Computer Science* in
partial fulfillment of the requirements for the degree of
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Acknowledgements

I want to thank my mum, dad and my cat.

1 Experimental Design

Dyin' ain't much of a livin', boy. Two little mice fell in a bucket of cream. The first mouse quickly gave up and drowned. The second mouse, wouldn't quit. He struggled so hard that eventually he churned that cream into butter and crawled out. Gentlemen, as of this moment, I am that second mouse. I'm neglecting my other guests. Enjoy yourself, you'll find the young ladies stimulating company. Ever notice how sometimes you come across somebody you shouldn't have F**ked with? Well, I'm that guy. This is the AK-47 assault rifle, the preferred weapon of your enemy; and it makes a distinctive sound when fired at you, so remember it. Two little mice fell in a bucket of cream. The first mouse quickly gave up and drowned. The second mouse, wouldn't quit. He struggled so hard that eventually he churned that cream into butter and crawled out. Gentlemen, as of this moment, I am that second mouse. This is America, babe, you gotta think big to be big. This is my gun, Clyde! He hid it in the one place he knew he could hide something: his ass. Five long years, he wore this watch up his ass. Then, when he died of dysentery, he gave me the watch. Selina! Selina Kyle, you're fired! And Bruce Wayne, why are you dressed up like Batman? I thought about you every time I jerked off, dickhead. I don't know what you want, but I know I can get it for you, with a minimum of fuss! Money, jewels, a *very* big ball of string.

2 Introduction

Some go code [Max14]:

```
var sem = make(chan int, MaxOutstanding)

func handle(r *Request) {
    1 -> sem    // Wait for active queue to drain.
    process(r) // May take a long time.
    <-sem      // Done; enable next request to run.
}

func Serve(queue chan *Request) {
    for {
        req := <-queue
        go handle(req) // Don't wait for handle to finish.
    }
}
```

Another example using Rust:

```
use std::cell::RefCell;
use std::fs::File;
use std::path::Path;
use std::rc::Rc;

fn record_fps(last_time: &mut f64, frames: &mut usize) {
    if cfg!(debug) {
        let now = time::precise_time_s();
        if now ≥ *last_time + 1f64 {
            println!("{}", FPS, *frames);
            *frames = 0;
            *last_time = now;
        } else {
            *frames += 1;
        }
    }
}
```

}
 }
}

3 Results and Design

You're talking to me all wrong... It's the wrong tone. You do it again and I'll stab you in the face with a soldering iron. Hey, tell me, does your mother sew? BOOM. Get her to sew that! This is my gun, Clyde! You see, in this world there's two kinds of people, my friend: Those with loaded guns and those who dig. You dig. don't p!ss down my back and tell me it's raining. Did you hear about the happy Roman? He was "glad he ate her." What you have to ask yourself is, do I feel lucky. Well do ya' punk? Well, do you have anything to say for yourself? I got a fever, and the only prescription is more cowbell. Dyin' ain't much of a livin', boy. This is America, babe, you gotta think big to be big. You got the wrong guy, ace! What do you want me to say, that I'm sorry? That I apologize? Well, people in Hell want ice water, pal.

4 Background

Selina! Selina Kyle, you're fired! And Bruce Wayne, why are you dressed up like Batman? When a naked man's chasing a woman through an alley with a butcher knife and a hard-on, I figure he's not out collecting for the Red Cross. Are you feeling lucky punk When a naked man's chasing a woman through an alley with a butcher knife and a hard-on, I figure he's not out collecting for the Red Cross. Did you hear about the happy Roman? He was "glad he ate her." You know why the Yankees always win, Frank? it's 'cause the other teams can't stop staring at those damn pinstripes. He hid it in the one place he knew he could hide something: his ass. Five long years, he wore this watch up his ass. Then, when he died of dysentery, he gave me the watch. You're talking to me all wrong... It's the wrong tone. You do it again and I'll stab you in the face with a soldering iron. Hey, tell me, does your mother sew? BOOM. Get her to sew that! I thought about you every time I jerked off, dickhead. Ever notice how sometimes you come across somebody you shouldn't have F**ked with? Well, I'm that guy. Are you feeling lucky punk Here. Put that in your report!" AND "I may have found a way out of here.

$$\nabla \times \vec{\mathbf{B}} - \frac{1}{c} \frac{\partial \vec{\mathbf{E}}}{\partial t} = \frac{4\pi}{c} \vec{\mathbf{j}} \quad (4.1)$$

$$\nabla \cdot \vec{\mathbf{E}} = 4\pi\rho \quad (4.2)$$

$$\nabla \times \vec{\mathbf{E}} + \frac{1}{c} \frac{\partial \vec{\mathbf{B}}}{\partial t} = \vec{\mathbf{0}} \quad (4.3)$$

$$\nabla \cdot \vec{\mathbf{B}} = 0 \quad (4.4)$$

5 Conclusion

I'm neglecting my other guests. Enjoy yourself, you'll find the young ladies stimulating company. Here. Put that in your report!" AND "I may have found a way out of here. What do you want me to say, that I'm sorry? That I apologize? Well, people in Hell want ice water, pal. Man's gotta know his limitations. You see, in this world there's two kinds of people, my friend: Those with loaded guns and those who dig. You dig. I don't know what you want, but I know I can get it for you, with a minimum of fuss! Money, jewels, a *very* big ball of string. This is the AK-47 assault rifle, the preferred weapon of your enemy; and it makes a distinctive sound when fired at you, so remember it. What you have to ask yourself is, do I feel lucky. Well do ya' punk? You want a guarantee, buy a toaster. You know why the Yankees always win, Frank? it's 'cause the other teams can't stop staring at those damn pinstripes. You got the wrong guy, ace! I got a fever, and the only prescription is more cowbell.

Abstract

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The aim of this thesis is to investigate and identify the present status of abstract writing in English for bachelor's and master's theses at the UAS Wildau, and to make recommendations for students who are required to produce abstracts in English.

In the first part, results of a short empirical survey of the university faculties and degree programs are presented. These show that there is growing demand for student abstracts in English, but at present students receive very little guidance in this matter.

The thesis then identifies the uses of an English abstract, and further outlines the structure of an abstract. In a detailed central section the thesis provides students with useful practical tips on the language of abstracts, including rules for creating headings and titles, and giving lists of phrases and vocabulary that are commonly used in abstracts. Here, the thesis draws on a number of sources from other universities and books on academic writing in English.

In conclusion, the thesis argues that abstract writing in English is essential but that students should not be expected to be able to write good abstracts without assistance. This thesis hopes to offer all UAS Wildau students useful tips on writing abstracts in English, and thus make a small contribution to improving the general standard of bachelor's and master's theses.

[source](#)

Appendix

List of Figures

List of Tables

References

- [Max14] John Doe Max Musterman. *Placeholder Book*. The Placeholder Company, 2014. ISBN: 123-456-789.

Erklärung (Statement of Originality)

I hereby declare, that this master's thesis is original work performed by me, and that all resources and references to other works that I used are properly and duly cited. I am aware, that any kind of infringement can, even retroactively, entail the revocation of my degree.

Ich versichere, dass ich die vorliegende Arbeit selbständig und nur unter Verwendung der angegebenen Quellen und Hilfsmittel angefertigt habe, insbesondere sind wörtliche oder sinngemäße Zitate als solche gekennzeichnet. Mir ist bekannt, dass Zuwiderhandlung auch nachträglich zur Aberkennung des Abschlusses führen kann.

Leipzig, 9. Oktober, 2015

Andreas Linz