KFS_1

Grub, boot and screen

Louis Solofrizzo louis@ne02ptzero.me

42 Staff pedago@42.fr

Summary: The real code !

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Chapter I

Forewords

Brendan Sullivan
i dont get gay marriage... two men doing that is just wrong.
Like · Comment · 5 days ago ·

0 like this.

Robert Graves What's there to get? It's just a couple of fellas having a go at each other.
5 days ago · Like · 1

Brendan Sullivan it goes against god... not something youd understand
5 days ago · Like

Robert Graves You're right. It's not something I'd understand. If I were discussing this with anyone else, I would bring up the argument that your personal religious beliefs should not affect the true love of two other people. But then I remember that you have the emotional range of a watercress sandwich and you are totally indifferent to the feelings and lives of others. So I won't bother.
5 days ago · Like · 4

Brendan Sullivan what the f*k do you mean by that u fag
4 days ago · Like

Robert Graves Nothing. Enjoy your Thanksgiving.
4 days ago · Like · 2

Write a comment ...

Cathy Miller
Guess who's going to Paris this summer!!! 😀😀😀😀😀😀
Like · Comment · 9 days ago ·

8 people like this.

Brendan Sullivan watch out for the ragheads while ur their... lol
8 days ago · Like

Robert Graves Also be on the lookout for xenophobic inbred loony-biscuits who haunt your Facebook page with their inane comments.
8 days ago · Like · 3

Write a comment ...

Brendan Sullivan

is it just me or does the martian look dumb... maybe like a netflicks movie or something... how would he live on mars for so long... stupid...

Like · Comment · one month ago · 🌐

👍 1 person likes this.

Robert Graves The book actually goes quite in-depth as to how one would go about surviving on Mars for such a long period of time, based on math and the protagonist's background in botany. It's a good read.
one month ago · Like · 👍 2

Brendan Sullivan but how can he live if theyres no sound in space
one month ago · Like

Robert Graves Your train of thought is stalled at the station as always, Brendan.
one month ago · Like · 👍 2

Cathy Miller Haha poor Brendan...
one month ago · Like · 👍 1

Brendan Sullivan my 'train of thought' isnt stalled you f*king fag i just asked a simple question now are you going to answer it or not?!!?!
one month ago · Like

Robert Graves Very well. Although there is indeed no sound in space, as you so eloquently observed, there are miraculous devices that have been invented that allow humans to live and breathe in harsh environments, such as the Martian surface. These devices do not depend at all on whether or not sound can be transferred through the void of space. I see you are a simple man, and of delicate constitution, so I thought I might clear that up for you.
one month ago · Like · 👍 3

Brendan Sullivan suck my dick you fag thats not at all what i said. i said the movie was unrelistic because noone could live on mars for any period of time without things we need like sound or food or water. get it now?
one month ago · Like

Robert Graves Much in the way sound cannot travel in space because it is a void, thoughts cannot travel in Brendan's head.
one month ago · Like · 👍 5

Brendan Sullivan

fight club: 5/7 movie

Like · Comment · 9 days ago · 🌐

👍 4 people like this.

Robert Graves Five out of seven? I must say, this is a grading scale like no other I've seen before.
9 days ago · Like · 👍 2

Brendan Sullivan shut the f*k up rob i liked the movie. i thought it was dark and mysterious, almost as good as the dark night
9 days ago · Like

Robert Graves Yes, I don't think we'll soon forget "The Dark Night," the masterful superhero film by Nistopher Colon.
9 days ago · Like · 👍 2

Brendan Sullivan what the hell is that supposed to mean. whatever i dont care. the point is i liked fight club and i would give it a perfect score
9 days ago · Like

Robert Graves Sullivan's Theorem: In film-reviewing situations, the integer five (5) is roughly equivalent to the integer seven (7). Note: This is not applicable in any other scenario.
9 days ago · Like · 👍 5

Brendan Sullivan why do you do htis on every single status i post. seriously
9 days ago · Like

Robert Graves Well, you make it so easy.
9 days ago · Like · 👍 2

Write a comment ...

Brendan Sullivan

f*kin imigrants comin in from iraq and syria... stick em in arizona if they like the desert so much... lol... or better yet SEND THEM BACK WHERE THEY CAME FROM

Like · Comment · five days ago · 🌐

👍 0 like this.

Robert Graves Your comment suggests that your family has a background rich in biodiversity.
five days ago · Like · 👍 3

Write a comment ...

Brendan Sullivan

five days until krampus comes out! excited to see this one

Like · Comment · two days ago · 🌐

👍 4 people like this.

Robert Graves So... a week?
one day ago · Like · 👍 2

Brendan Sullivan i f*king hate you
one day ago · Like

Write a comment ...

Sara Marie ▓▓▓
Love the way rain smells 💗
Like · Comment · 9 days ago · 🌐

👍 4 people like this.

Robert Graves It's about time it rained... the whole state is going to turn into Mad Max if we don't get some moisture in the air soon.
9 days ago · Like · 👍 2

Brendan Sullivan i like the rain too lol.
9 days ago · Like

Robert Graves What are your thoughts on Mad Max, Brendan?
9 days ago · Like

Brendan Sullivan i liked the new movie but not the old ones.
8 days ago · Like

Robert Graves Really? Because I thought the second one was a solid 5/7.
8 days ago · Like · 👍 3

Sara Marie ▓▓▓ Not this again
8 days ago · Like

Write a comment ...

Brendan Sullivan
mighty python and the holy grail-- worst film ive ever seen!!!!!!
Like · Comment · 2 days ago · 🌐

👍 1 person likes this.

Robert Graves Yes, Mighty Python certainly were a mighty group of comedic titans. Mighty fine post, Brendan.
2 days ago · Like · 👍 4

Sara Marie ▓▓▓ Rob... shut the fuck up! U have been way too hard on Brendan recently! stop it or i will block u!
2 days ago · Like

Robert Graves Sara, stay out of this or I'll slap you with my mighty python.
2 days ago · Like · 👍 4

Write a comment ...

Brendan Sullivan
mass shooting at planned parenthood,.. of course obama is using it as an excuse for taking away are guns
Like · Comment · a day ago · 🌐

👍 1 person likes this.

Robert Graves You do realize that people died, right? Is now really the time to complain about stricter gun regulations that may prevent such things from happening?
a day ago · Like · 👍 2

Brendan Sullivan yes people died that is not the issue. i am talking about gun control so please stay on topic
a day ago · Like

Robert Graves Do you understand how insensitive you sound? How are your personal opinions somehow more important than the lives of innocent people?
a day ago · Like · 👍 2

Brendan Sullivan the point though. is that the governemnt will use this as an excues to take away guns. americans need to join together and vote to make sure that doesnt happen!
a day ago · Like

Robert Graves Who are you voting for, Brendan?
a day ago · Like

Brendan Sullivan i am a proud supporter of DONALD TRUMP
a day ago · Like

Robert Graves I rest my case.
a day ago · Like · 👍 4

Nathan Pearce
Should marijuana be legal? Discuss.
Like · Comment · 21 days ago · 🌐

👍 11 people like this.

Brendan Sullivan no
21 days ago · Like · 👍 3

Cathy Miller I personally say yes, but I see why people would disagree. Let's keep it civil here guys 🙂
21 days ago · Like · 👍 5

Robert Graves I'm surprised you'd say no, Brendan. Isn't polluting my body with the devil's lettuce my right as a free American?
21 days ago · Like · 👍 6

Brendan Sullivan no because it is not legal. and therefore it is not your right
21 days ago · Like

Robert Graves Well, that's really not what we're discussing here. We were talking about whether or not it SHOULD be legal, not whether or not it is. And I said it SHOULD be my right, not that it is my right. See the difference?
21 days ago · Like · 👍 2

Brendan Sullivan no because it is not yoru right to break the law
20 days ago · Like

Nathan Pearce Come on, Brendan... Christ.
20 days ago · Like · 👍 1

Robert Graves Brendan, are you high right now?
20 days ago · Like · 👍 5

Brendan Sullivan it is my PATRIOTIC DUTY as an AMERICAN to uphold the law.
20 days ago · Like

Robert Graves And it is my patriotic duty as an internet user to tell you that you're a hopeless cretin.
19 days ago · Like · 👍 2

Write a comment ...

Brendan Sullivan
just saw toy story 3... not a big fan... pixar is starting to really suck. did not like the ending at all. toy story 3 was better.
Like · Comment · 4 days ago · 🌐

👍 4 people like this.

> **Robert Graves** And I really wasn't big on the first Batman movie. Batman Begins was better.
> 4 days ago · Like · 👍 1

> **Brendan Sullivan** Batman begins was the first batman movie
> 4 days ago · Like · 👍 1

> **Robert Graves** As opposed to Toy Story 3, which was, as we all know, the second Toy Story movie.
> 4 days ago · Like

> **Brendan Sullivan** fuck you rob i meant toy story 2 not toy story 3. it was ovious. so just stop it
> 4 days ago · Like

> **Robert Graves** I, personally, would award Toy Story 3 a perfect 5/7 score.
> 4 days ago · Like · 👍 3

> Write a comment ...

Brendan Sullivan
cant believe kim davis story has disapeared... she stood up for what she believed in. but now gay marriag has been forced upon this great nation
Like · Comment · 23 days ago · 🌐

👍 1 person likes this.

> **Robert Graves** This is at least the fifth status you've made about gay marriage. Why do you care so much? Worrying about what a couple of gay dudes do in the privacy of their own home is about the gayest thing for a guy to do.
> 23 days ago · Like · 👍 2

> **Brendan Sullivan** WTF are you implying? i am 100 percent strait.
> 23 days ago · Like

> **Robert Graves** You're a narrow sea passage connecting two large bodies of water?
> 23 days ago · Like · 👍 5

> **Brendan Sullivan** ur not even making sense now... just stop talking before u embarrass yourself....
> 23 days ago · Like

> **Tim** ▮ Brendan, he's saying that you used the wrong "straight."
> 23 days ago · Like · 👍 2

> **Brendan Sullivan** no i did not because spellcheck recognizes it. u can spell it either way.
> 22 days ago · Like · 👍 2

> **Robert Graves** Don't even bother, Tim. It goes strait through one ear and out the other with ol' Brendan.
> 22 days ago · Like · 👍 5

> Write a comment ...

Brendan Sullivan
bout a new armor for my bedroom on craigs list today.
Like · Comment · 4 days ago · 🌐

👍 2 people like this.

> **Robert Graves** Cool, it'll go well with your guillotine and feudalistic ideologies.
> 4 days ago · Like · 👍 1

> **Brendan Sullivan** wtf are you talking about
> 4 days ago · Like

> **Michael** ▮ Lol Brendan...
> 4 days ago · Like · 👍 1

> **Robert Graves** My mistake. I thought, given the first word in Brendan's post and his reference to medieval garments, he was challenging me to another proverbial "bout" of internet witticisms. I see that I was incorrect.
> 4 days ago · Like · 👍 3

> **Brendan Sullivan** its a f*king armour dude i dont no how to f*king spell it. so just lay off
> 4 days ago · Like

> **Cathy** ▮ Brendan... do you mean an armoire? Like a wardrobe?
> 4 days ago · Like · 👍 2

> **Robert Graves** I, for one, keep all my chainmail safely inside my armoire where it belongs.
> 4 days ago · Like · 👍 3

> Write a comment ...

Cathy ▮
My niece turns 17 today. Lots of love, Emily!
Like · Comment · 14 hours ago · 🌐

👍 4 people like this.

> **Brendan Sullivan** special age... congrats
> 14 hours ago · Like · 👍 1

> **Robert Graves** Happy 15th birthday, Emily!
> 13 hours ago · Like · 👍 4

> **Brendan Sullivan** rob for the last f*king time shut up with the 5 = 7 bullsh*t im f*king done with it. i will report u.
> 12 hours ago · Like

> **Robert Graves** Cathy, have you considered getting Emily a nice armor for her big day?
> 11 hours ago · Like · 👍 6

> **Brendan Sullivan** i f*king hate you
> 11 hours ago · Like

> Write a comment ...

Brendan Sullivan

rob has been a giant pain in the a** recently... as im sure you all know lol. people have messaged me saying i shold block him. but if i block him he wins. i need ot show him i dont care about his child comments.

Like · Comment · a day ago · 🌐

👍 1 person likes this.

> **Robert Graves** Ah, I see... you don't care. That's why you made an entire status about it. Gotcha.
> a day ago · Like

> **Sara Marie** ▮▮▮▮ Brendan just block him!!! Rob stop it!!!
> a day ago · Like

> **Brendan Sullivan** y are u doing this.
> a day ago · Like

> **Robert Graves** Because I and everyone else who knows you has put up with your idiocy on our feeds for far too long. Someone had to call you out on it. A silent protector... a watchful guardian... a Dark Night.
> a day ago · Like · 👍 2

> **Brendan Sullivan** ur so f*king obnoksious
> a day ago · Like

> **Robert Graves** Remember Brendan, if you block me, the terrorists win.
> a day ago · Like · 👍 3

> Write a comment ...

Brendan Sullivan

going bungy jumping this weekend... cant wait lol.

Like · Comment · 14 days ago · 🌐

👍 4 people like this.

> **Sara Marie** ▮▮▮▮ Have fun!
> 14 days ago · Like · 👍 3

> **Robert Graves** Natural selection, do your stuff!
> 14 days ago · Like · 👍 8

> Write a comment ...

Chapter II

Introduction

Welcome to the first `Kernel from Scratch` subject.

Finally some real coding, I'm sure you were annoyed by the Linux Kernel subjects. In the `Kernel from Scratch` subjects you are going to write a Kernel from Scratch (No shit ?), without any existing software, API, or such.

When you will finish those subjects, with your non-revolutionnary-OS, you will be able to laugh at those ordinary Javascript developers, who obviously, don't know anything about code.

On a more serious note, those kernel programming skills are not very spread in the IT world, so `take your time` to understand every different points on those subjects. One does not simply consider himself a 'Kernel developer' if it only knows things about drivers or syscalls, like a sysadmin only knows things about iptables or softwares installation... It's a package of skills.

A note about the code itself :

The `Kernel from Scratch` will be dispatched in many subjects, each one will dealing with a side of kernel programming. All of those subjects are linked together. So when you code those amazing features, keep in mind that your kernel must be flexible and functions must easily fit in it. 50% of the time you'll spend on these subjects is to add links between different sides of your Kernel.

For example, you must write memory code before processus & execution code. But processus must use memory, right ? So, you gotta link those two ! So keep your code *clean*, and your internal API simple.
Good luck, and most of all, have fun :)

Chapter III

Goals

At the end of this subject, you will have:

- A kernel you can boot via `GRUB`
- An `ASM` bootable base
- A basic kernel library, with basics functions and types
- Some basic code to print some stuff on the screen
- A basic "Hello world" kernel

Actually, there isn't so much code. This subject is an introduction to kernel development. You will learn how to boot, how to debug and how to work on it.

Kind of things required for the future !

Chapter IV

General instructions

IV.1   Code and Execution

IV.1.1   Emulation

The following part is not mandatory, you are free to use any virtual manager you want to, however, i suggest you to use `KVM`. It's a `Kernel Virtual Manager`, and have advanced execution and debugs functions. All of the examples below will use `KVM`.

IV.1.2   Language

All of `Kernel from Scratch` subjects have no constraints on the language you want to use.

C language is not mandatory at all, you can use any language. However, keep in mind that all language are not kernel friendly. So... Yes, you could code a Kernel in javascript, but are you sure it's a good idea ?

Also, a lot of example on the documentations are in C, so remember that you will do 'code translation' all the time if you choose a different language.

Furthermore, all of the features of a language cannot be used in a basic kernel.

Let's take C++ for example:

C++ use 'new' to make allocation, class and structures declaration. But in your kernel you do not have a memory interface (yet), so you cannot use those features in the beginning.

A lot of language can be used instead of `C`, like `C++`, `Rust`, `Go`, etc. You could even code your entire kernel in `ASM` if you want !

So yeah, choose a language, but choose wisely.

IV.2   Compilation

IV.2.1   Compilers

You can choose any compilers you want. I personnaly use `gcc` and `nasm`. A Makefile must be turn in to.

IV.2.2   Flags

In order to boot your kernel without any dependencies, you must compile your code with the following flags (Adapt the flags for your language, those ones are a `C++` example):

- `-fno-builtin`
- `-fno-exception`
- `-fno-stack-protector`
- `-fno-rtti`
- `-nostdlib`
- `-nodefaultlibs`

Pay attention to `-nodefaultlibs` and `-nostdlib`. Your Kernel will be compiled on a host system, yes, but cannot be linked to any existing library on that host, otherwise it will not be executed.

IV.3   Linking

You cannot use an existing linker in order to link your kernel. As written above, your kernel will not boot. So, you must create a linker for your kernel.
Be carefull, you `CAN` use the 'ld' binary available on your host, but you `CANNOT` use the .ld file of your host.

IV.4   Architecture

The i386 (x86) architecture is `mandatory` (you can thank me later).

IV.5   Documentation

There is a lot of documentation available, good and bad. I personnaly think the OSDev wiki is one of the best.

Chapter V

Mandatory part

V.0.1   Base

You must make a kernel, bootable with `GRUB`, who can write characters on screen.
In order to do that, you have to:

- Install `GRUB` on an virtual image

- Write an `ASM` boot code that handles multiboot header, and use `GRUB` to init and call main function of the kernel itself.

- Write basic kernel code of the choosen language.

- Compile it with correct flags, and link it to make it bootable.

- Once all of those steps above are done, you can write some helpers like kernel types or basic functions (strlen, strcmp, ...)

- Your work should not exceed 10 MB.

- Finally, code the interface between your kernel and the screen.

For the link part, you must create a linker file with the `GNU linker (ld)`. Some docs
here.

V.0.2   Makefile

Your makefile should compile all your source files with the rights flags and the right com-
piler. Keep in mind that your kernel will use at least two different languages (ASM and
whatever-you-choose), so make (<- joke) your Makefile's rules correctly.

After compilation, all the objects must be linked together in order to create the final
Kernel binary (Cf. Linker part).

Chapter VI

Bonus part

- Add scroll and cursor support to your I/O interface.

- Add colors support to your I/O interface.

- Add helpers like printf / printk in order to print information / debug easily.

- Handle keyboard entries and print them.

- Handle different screens, and keyboard shortcuts to switch easily between then.

Chapter VII

Turn-in and peer-evaluation

Turn your work into your `GiT` repository, as usual. Only the work present on your repository will be graded in defense.

Your must turn in your code, a Makefile and a basic virtual image for your kernel. Carefull about that image, your kernel does nothing with it yet, SO THERE IS NO NEED TO BE SIZED LIKE AN ELEPHANT.