

# VIREX : Virtual Execution Console

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**VIREX** (VIRtual EXecuter) is a platform-independent virtual machine designed around a flexible intermediate language called **SASM** (Simulated Assembly). It's inspired by the **Java Virtual Machine (JVM)**, but unlike JVM bytecode, SASM is **open, readable, and writable** — you can program directly in it.



## What is SASM?

Just like Java compiles to bytecode for the JVM, any language can be compiled into SASM for VIREX. The difference is:

- SASM is **assembly-like**, human-readable, and editable.
- SASM is **open**, letting anyone build tools and languages around it.

You can even create your own programming language that compiles into SASM and runs anywhere VIREX runs — making your language instantly portable.



## Why SASM?

- Learn how **assembly-level code** works through a clean and simplified syntax.
- Build a **compiler** without worrying about machine-level code generation.
- Make your own language **platform-independent** by targeting SASM.



## Current Features

-  **VS Code syntax highlighter** for SASM
-  **AST visualizer** for seeing how your SASM code is parsed and compiled
-  A new programming language called **ORIN** is currently under development. It is being designed to compile directly to SASM.

If you're interested in compilers, language design, or virtual machines — **contributions are very welcome!**



## Project Structure

```
/docs/      # Reference documentation
/examples/  # Sample programs
/include/   # Public headers for VM, SASM, OCC
/src/       # Core implementation (VM, assembler, compiler)
/tests/     # Simple Test programs written in SASM
/tools/themes/vs_code/ # VS Code syntax highlighter
/install.sh # Install script for linux
```

# Getting Started (LINUX)

## 1. Clone this repo:

```
git clone https://github.com/Soham-Metha/virex.git
cd virex/
```

## 2. Build the project (requires **sudo**):

```
./install.sh
```

## 3. Run an example program:

```
cd ./examples/SASM/
virex
```

If the **TUI doesn't render properly**, try adjusting your **terminal font size**.

If that doesn't help, you can tweak layout values in **src/VM/vm\_tui.c::CreateWindows()**.  
The constants used are defined as **percentages** of the screen dimensions.

P.S. **kitty terminal** config, and font used, are available in **/tools**

## 4. Inside VIREX, do the following:

- Select **"Run SASM/ORIN command with custom flags"**
- Enter the following command:

```
-i helloWorld.sasm -I ./ -o tmp.sm
```

 use **Arrow keys** for navigation in menu.

- Select **"SASM build and exec"** by pressing **'a'**
- Enter the output filename (**tmp.sm**)

## 5. Activate the syntax highlighter in VS Code

- Open VS Code
- Press **Ctrl + Shift + P**
- Type: **Preferences: Color Theme**
- Select: **Palenight+sasm**

 Open any **.sasm** file in vs code to see the syntax highlighter at work!

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## Want to Contribute?

We're actively building:

1. The **ORIN** programming language
2. Improved **SASM** tooling (UI, debuggers, optimizers, etc.)
3. Expanded **Documentation** and **tutorials**

!!! info inline end ""

 For contribution guidelines and a roadmap, see [CONTRIBUTING.md]() (coming soon).

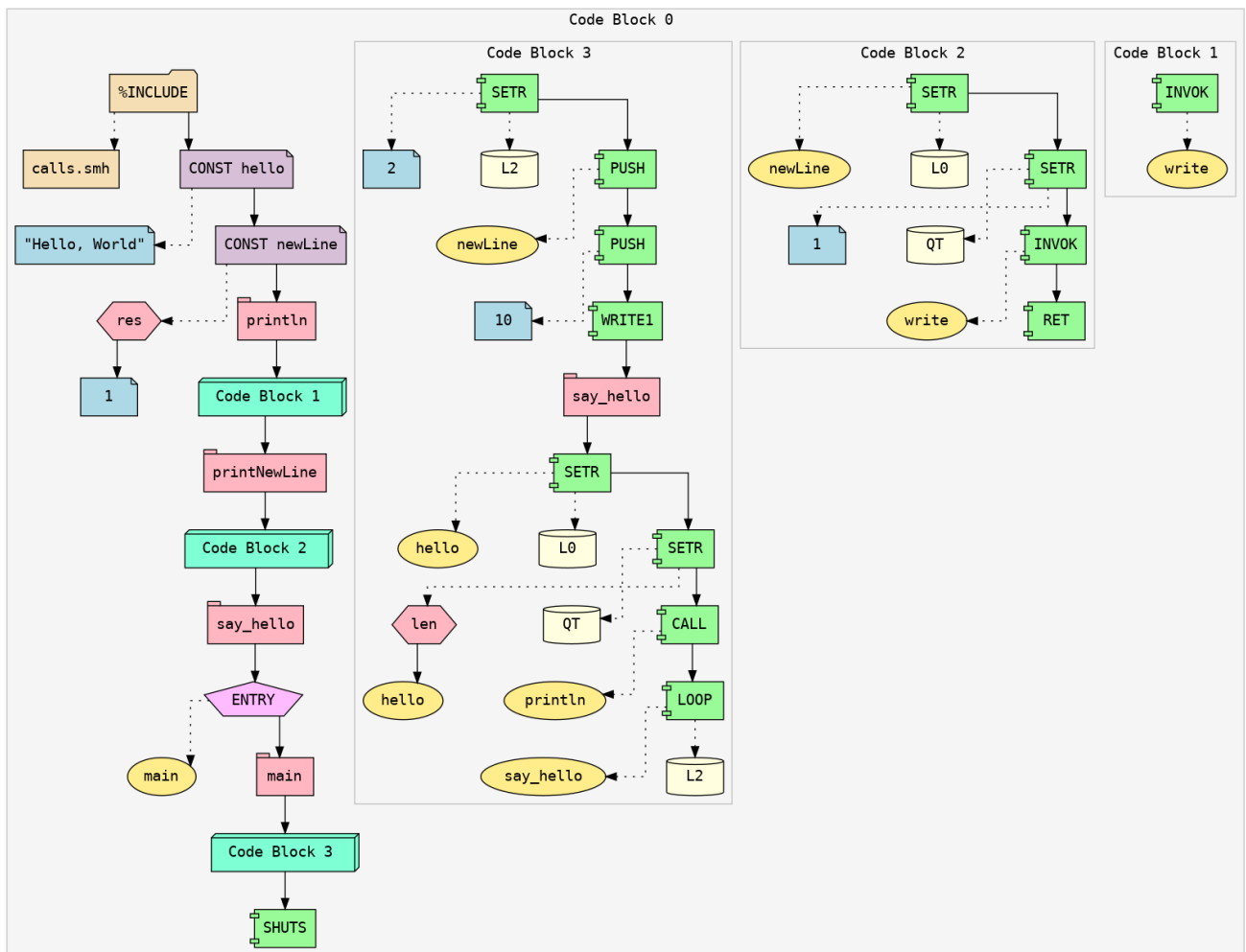
## Examples

### Syntax Highlighting:

```
helloWorld.sasm M X
extras > samplePrograms > helloWorld.sasm
You, 2 minutes ago | 1 author (You)
1 %include "calls.smh"
2
3 %bind hello "Hello, World" ; Compile-time Escape characters not yet supported, specify at runtime instead
4 %bind newLine res(1) ; reserves 1 byte in memory for the newline character
5
6 println:
7 %scope ; "write" is a integer const defined in 'calls.smh'
8 | INVOK write ; INVOK is used to invoke a syscall(vsyscall?)
9 %end ; No RET here will lead to a fallthrough, printing a newline as well
10 printNewLine:
11 %scope
12 | SETR newLine [L0] ; SETR expects reference to a register(register ID), we can specify
13 | SETR 1 [QT] ; reference or value using ref([QT]) or val([QT]), default is ref()
14 | INVOK write ; Will print QT(Quantity of) characters starting from location stored in L0
15 | RET
16 %end You, last month • Sasm Parser Rewrite done ...
17
18 say_hello: ; global 'say_hello'
19 %entry main: ; inline define label 'main' as the entry point of the program
20 %scope ; start local scope for main, optional, if not done, main runs in global scope
21 | SETR 2 [L2] ; SET Register 'L2' to 2
22 | PUSH newLine ; ptr to location
23 | PUSH 10 ; ASCII for newline
24 | WRITE1 ; Override 1 byte in memory, can use WRITE{1,2,4,8} depending on byte count
25 say_hello: ; local 'say_hello'
26 | SETR hello [L0] ; register L0 -> pointer to hello msg
27 | SETR len(hello) [QT] ; register QT -> length of hello msg
28 | CALL println
29 | LOOP say_hello [L2] ; Loop over label 'say_hello' - 'L2' times, P.S. zero inclusive
30 %end ; end local scope of main
31 SHUTS ; SHUT System
32
```

{ width="400" }

### AST:

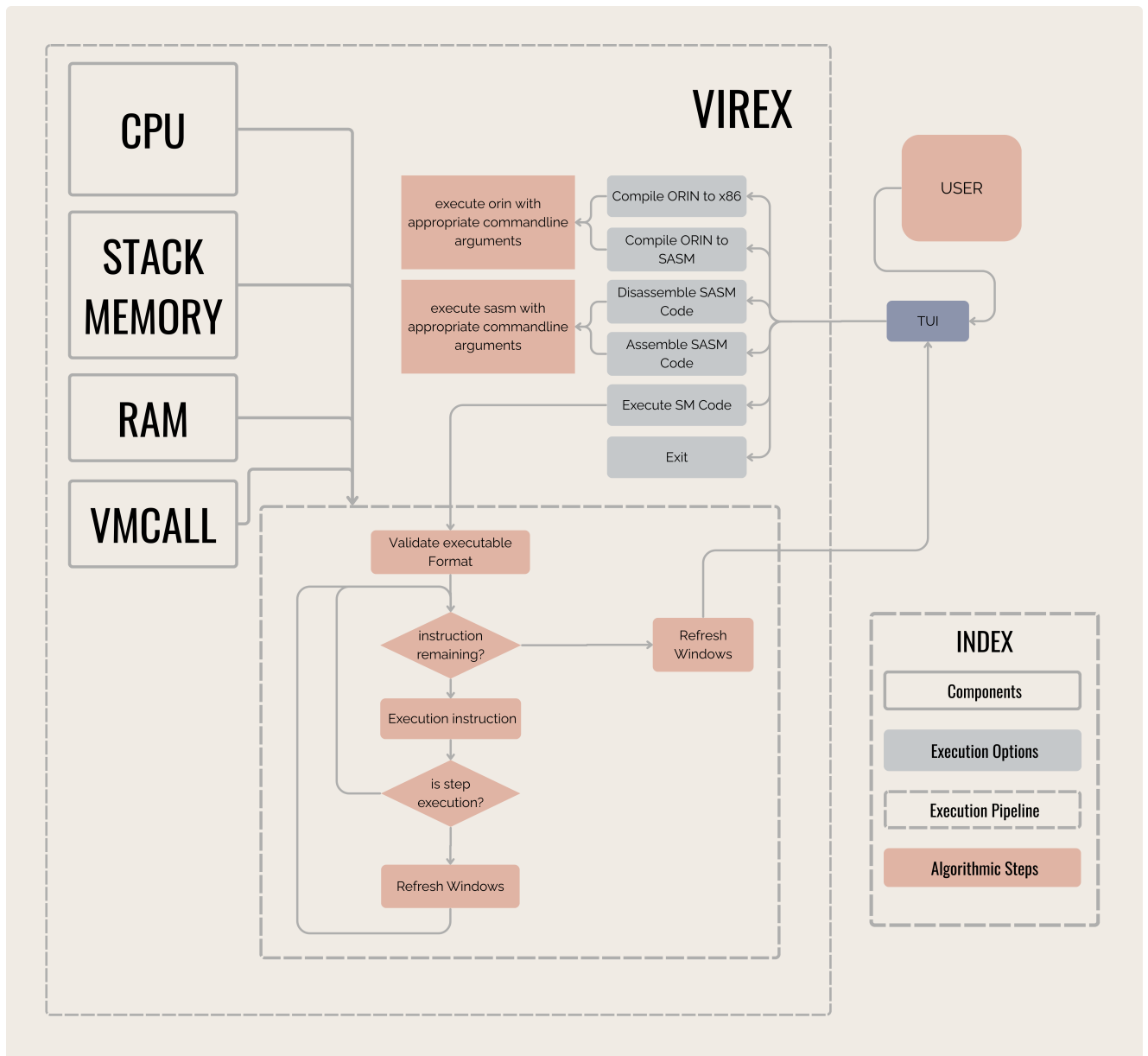


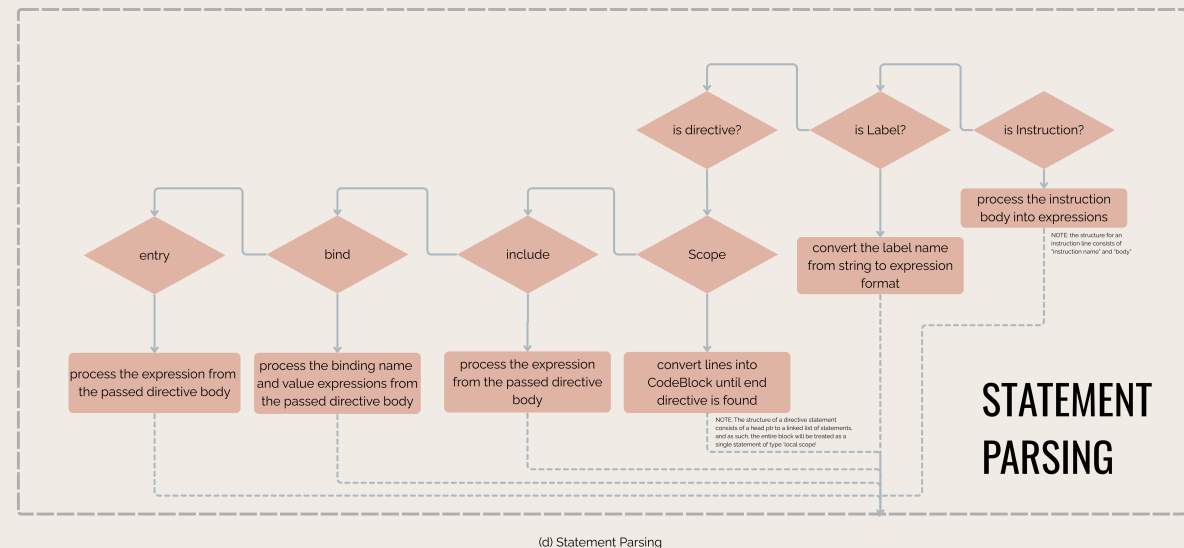
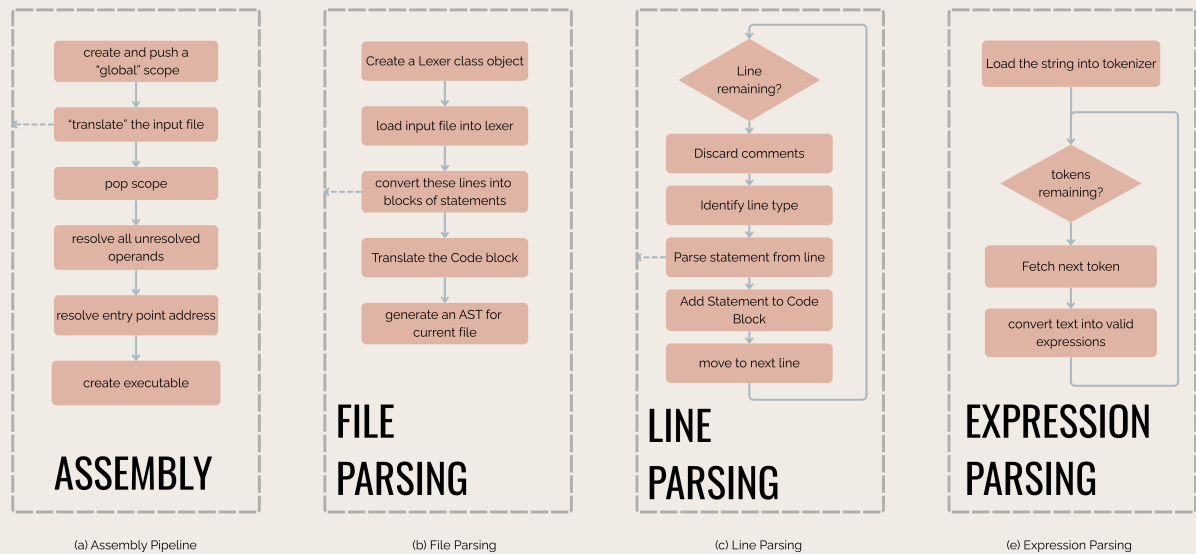
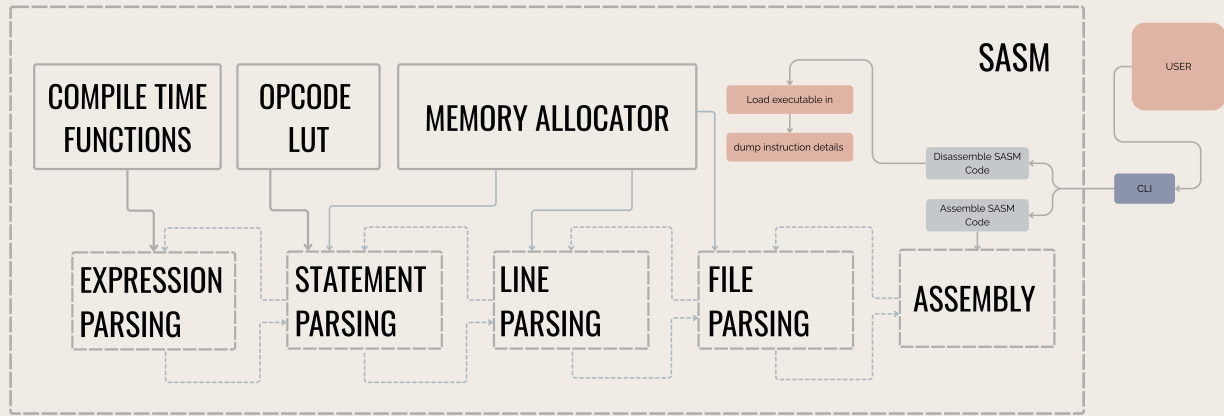
!!! info "Local/Global Scopes"

Each Code Block in the visualized AST represents a Scope, Block 0 being global scope.

## Binary Executable:







## Tech Stack

- **Programming Language: C**

- **Version Control:** Git
  - **Build System:** GNU Make
  - **AST VISUALIZER:** Graphviz
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## Maintainers

Tool	Maintainer
<b>VIREX, SASM</b>	Soham Metha
<b>AST visualizer</b>	Soham Metha
<b>Syntax Highlighter</b>	Soham Metha
<b>ORIN Compiler</b>	Omkar Jagtap
<b>Core lib(Hashtable)</b>	Omkar Jagtap
<b>Core libs(other)</b>	Soham Metha

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## References

- [Tsoding](#)
  - [Dr Birch](#)
  - [Low Byte Productions](#)
  - [Cobb Coding](#)
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