

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.



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!



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

Binary Executable:

helloWorld.sm X

Address	Hex	ASCII
00000000	53 4F 48 00 41 4D 00 00 0E 00 00 00 00 00 05 00 00 00 00 00 0D 00 00 00	SOH.AM.
0000001c	00 00 00 00 0D 00 00 00 00 00 00 00 00 00 00 00 01 00 00 00 00 00 00	.....
00000038	07 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 06 00 00 00	.....
00000054	00 00 00 00 00 00 00 00 00 00 00 00 00 00 06 00 00 00 00 00 00 00 00	.....
00000070	06 00 00 00 00 00 00 00 01 00 00 00 00 00 10 00 00 00 00 00 00 00 00	.....
0000008c	00 00 00 00 01 00 00 00 00 00 00 00 07 00 00 00 00 00 00 00 00 00 00	.....
000000a8	00 00 00 00 00 00 00 21 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00!
000000c4	00 00 00 00 00 00 00 00 00 00 00 06 00 00 00 00 02 00 00 00 00 00 00	.....
000000e0	08 00 00 00 00 00 00 00 00 00 00 00 00 00 0A 00 00 00 00 00 00 00 00	.....
000000fc	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 0A 00 00 00 00 00 00	.....
00000118	0A 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 45 00 00 00	.....E..
00000134	00 00
00000150	06 00 00 00 00 00 00 01 00 00 00 00 00 06 00 00 00 00 00 00 00 00 00
0000016c	00 00 00 00 06 00 00 00 00 00 00 0C 00 00 00 00 10 00 00 00 00 00 00	.....
00000188	00 00 00 00 00 00 00 08 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	.....
000001a4	00 00 00 00 00 00 00 00 00 00 00 09 00 00 00 00 09 00 00 00 00 00 00	.....
000001c0	08 00 00 00 00 00 00 00 00 00 00 00 00 00 05 00 00 00 00 00 00 00 00	.....
000001dc	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 48 65 6C 6C 2C 20	.....Hello,
000001f8	57 6F 72 6C 64	World

Signed 8 bit: 72 Signed 32 bit: 1214606444 Hexadecimal: 48 65 6C 6C X

Unsigned 8 bit: 0x48 Unsigned 32 bit: 0x48656c6c Decimal: 072 101 108 108

Signed 16 bit: 18533 Float 32 bit: 234929.7 Octal: 110 145 154 154

Unsigned 16 bit: 0x4865 Float 64 bit: 5.83203948143097E+40 Binary: 01001000 01100101 01101100 01101100

☐ Show little endian decoding ☒ Show unsigned as hexadecimal ASCII Text: Hell

Offset: 0x1f1 / 0x1fc Selection: 0x1f1 to 0x1f5 (0x5 bytes) INS

GUI:

./install.sh

DETAILS

REGISTERS

R0 : 0 R1 : 0
R2 : 4 R3 : 6
R4 : 0 R5 : 0
R6 : 0 R7 : 0
R8 : 67 R9 : 0
R10 : 0 R11 : 0
R12 : 0 R13 : 37
R14 : 0.000000 R15 : 5
R16 : 0
R17 : 0
R18 : 0
R19 : 1
R20 : 0

FLAGS

HT : F F1 : F F2 : F F3 : F
F4 : F F5 : F F6 : F F7 : F

INSTRUCTION

33 RET

OUTPUT

Binary Searching for 5
Used array :
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E
Found at :
5

MEMORY

00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 4F 7A 20 46 6F 75 6E 64 21 20 46 6F 75 6E 64 20
61 74 20 30 20 0A 42 69 6E 61 72 79 20 53 65 61 72 63 68 69 6E 67 20 46 6F 72 20 35 55 73 65 64
20 61 72 72 61 79 20 3A 20 00
00
00
00
00 00

PROGRAM

65 CALL 37
66 CALL 8
67 SHUTS

VIREX EXECUTOR

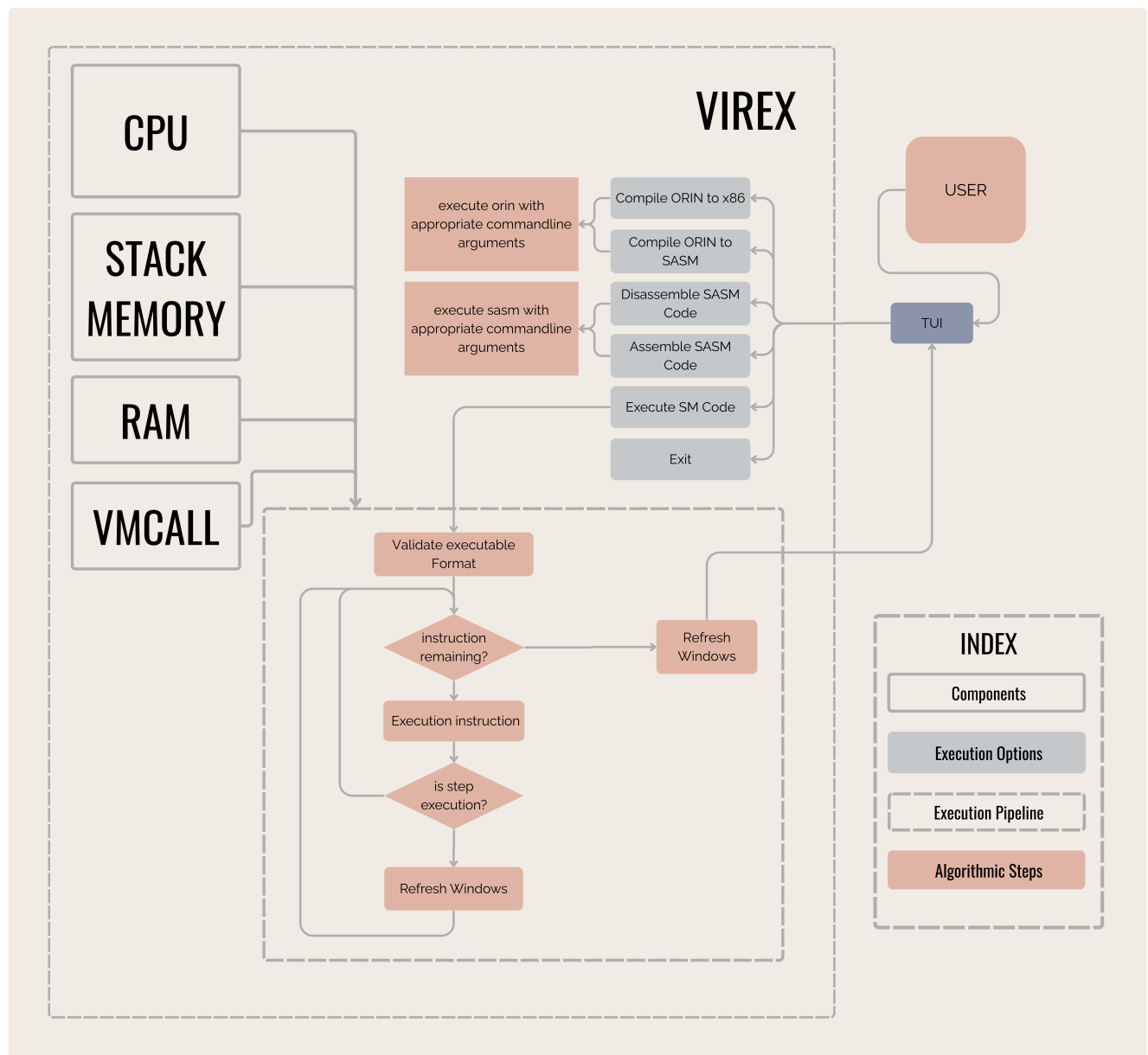
Enter the name of the SM file: tap.sm

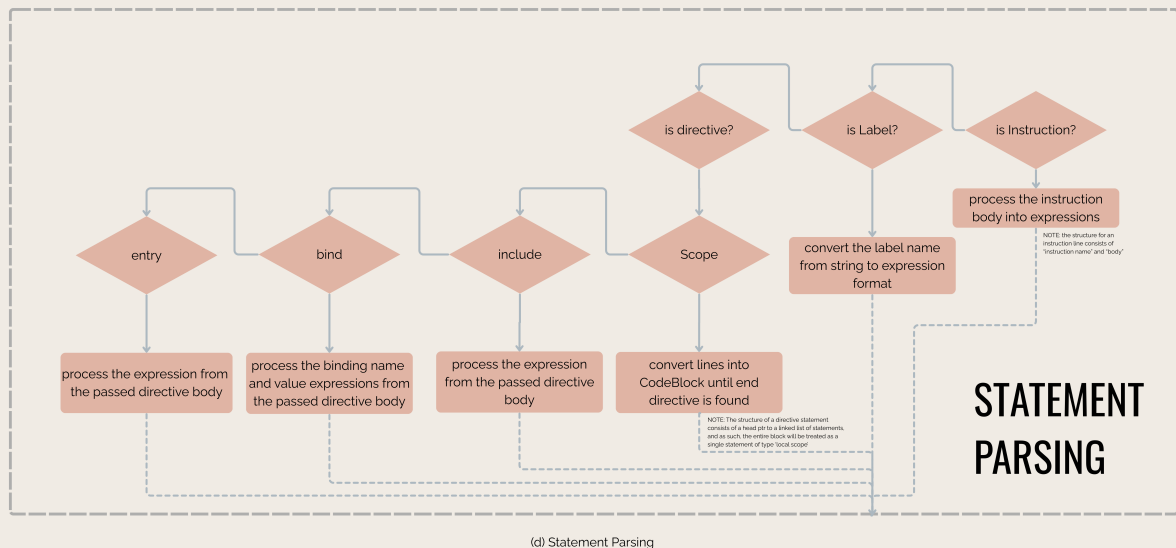
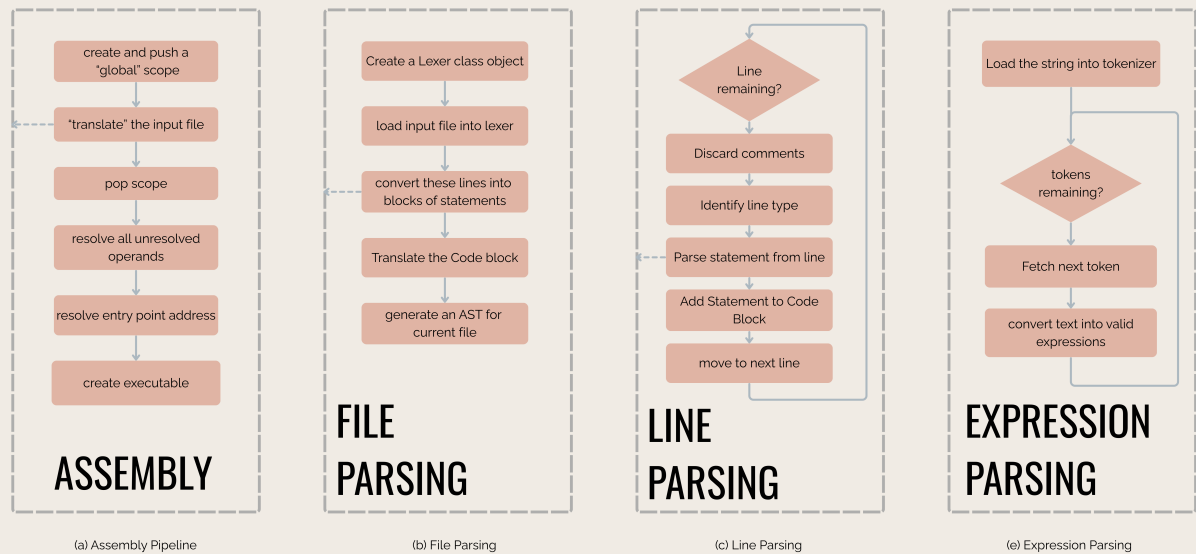
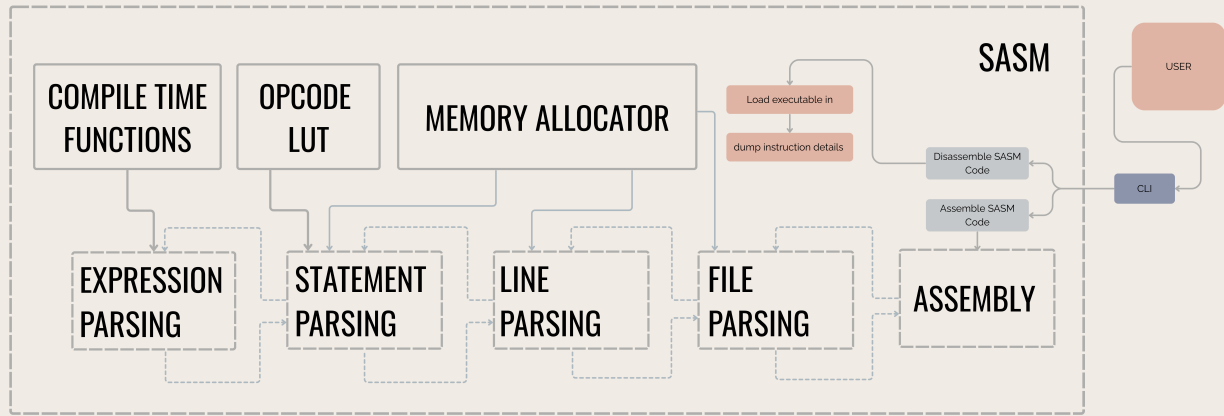
Debug Mode?
0. No
1. Yes
2. Fast Debug
Your choice : 2

CREDITS

VIREX, SASM : SOHAM METHA
AST Visualizer : SOHAM METHA
Syntax Highlighter : SOHAM METHA
ORIN Compiler : ONKAR JAGTAP
Core lib(hashTable) : ONKAR JAGTAP
Core lib(sOther) : SOHAM METHA

System Design and Architecture





Tech Stack

- **Programming Language: C**

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

Maintainers

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

References

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