

# **VIREX** — *The VIRtual EXecuter*

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**VIREX** is a portable, lightweight virtual machine that runs programs written in a custom intermediate language called **SASM** — *Simulated Assembly*. Think of it as the **JVM for your own language**, but with transparency, control, and a fully editable instruction set.

Designed to be educational and extensible, VIREX opens the door to systems-level thinking without forcing you to dive into raw x86 or ARM.

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## What Is SASM?

**SASM** is a human-readable assembly-like language designed to serve as the **intermediate representation (IR)** for any compiler targeting the VIREX runtime. Unlike conventional bytecode formats:

-  It's **text-based**, not binary — easy to inspect, diff, and version.
-  It's **editable by hand** — write or tweak your programs directly in SASM.
-  It's **tooling-friendly** — build compilers, assemblers, visualizers, and analyzers around it.

If LLVM IR is too complex and raw bytecode is too opaque, SASM is your sweet spot.

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## Why SASM + VIREX?

Whether you're a language designer, systems programmer, or just curious how virtual machines and compilers work, SASM and VIREX provide the perfect sandbox.






Here's what makes it special:

Feature	Benefit
<b>Open Instruction Set</b>	Customize or extend the VM with new opcodes and semantics
<b>Portable Execution</b>	Write once, run anywhere VIREX runs
<b>Clean Syntax</b>	Designed for learning, debugging, and experimentation
<b>Tooling Ecosystem</b>	Includes assembler, AST visualizer, VS Code syntax theme, and more
<b>Compiler-Ready</b>	Ideal IR target for custom languages like <b>ORIN</b>

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## What's Included?

VIREX isn't just a VM; it's a whole ecosystem for low-level development:

-  **SASM Assembler**: Translates `.sasm` files into VM-executable binaries.
  -  **AST Visualizer**: Graphical output of the instruction flow and scope tree.
  -  **VS Code Theme**: Rich syntax highlighting for SASM to improve readability.
  -  **Extensible Runtime**: Easily add new registers, memory models, or system calls.
  -  **ORIN Language (WIP)**: A high-level language that compiles directly to SASM.
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## The Vision

Our mission is to make systems programming **approachable**!

VIREX is designed for **education**, **experimentation**, and **language development**. By abstracting away the messiness of real hardware and binary formats, it lets you focus on:

- Designing instruction sets
  - Writing your own compiler backends
  - Learning how registers, stacks, and memory behave under the hood
  - Debugging complex logic through visual ASTs
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## Get Involved

Whether you're:

- a student learning compilers or virtual machines,
- an educator looking for hands-on systems material,
- a hacker building your own language,

VIREX welcomes contributions and collaboration. Visit our GitHub repo, try out SASM, or contribute to **ORIN** — our experimental high-level language.

Ready to run your first virtual assembly program? [Get started →](#)

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Let me know if you want this broken up into modular sections (e.g., About, Features, Tooling, Get Started) or if you're using `partials` and need it styled for a specific homepage layout.