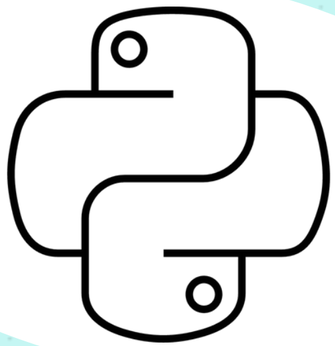
Bringing Python To Web Assembly



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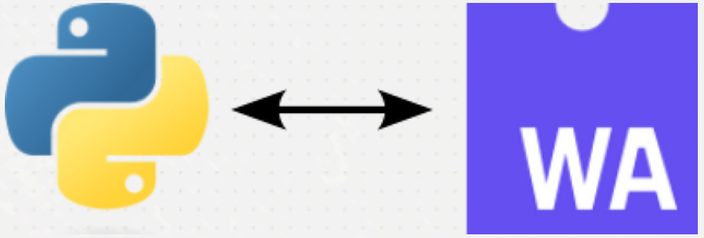
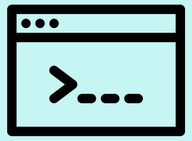
What is WASM?

It is a low-level, assembly-like, binary instruction format designed as a portable compilation target for higher-level programming languages like C, C++, Rust, and others

1. You write code in a language like C, C++, or Rust.
2. That code is compiled into WASM(a compact binary format).
3. Browsers (and other runtimes) execute WASM in a virtual machine, enforcing sandboxing and security.
4. JavaScript can load, interact with, and call functions from compiled WASM modules seamlessly.

Challenges



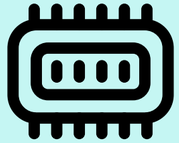


Interpreted Nature

Python is dynamically typed and interpreted, so most solutions involve compiling the interpreter itself (like CPython) to WASM.

Package Management

Maintaining compatibility for Python packages on WASM requires manual porting and active curation, since dependencies and CPython APIs differ.



Memory and Performance Constraints

WASM runs in a sandboxed environment with stricter memory and system limits, affecting how Python code performs and interacts with resources.

What are we trying for?

There is no transpiling solution.

All major solutions focus on running Python on WASM

Solutions like py2wasm and MicroPython exists which help to compile Python to WASM.

Feature	Python *on* WASM	Python *to* WASM
Interpreter needed?	✅ Yes	❌ No
Startup size	❌ Large (MBs)	✅ Tiny (KBs)
Runtime speed	❌ Slower (interpreted)	✅ Near-native
Language support	✅ Full Python	❌ Subset/static
Deployment	❌ Heavy	✅ Lightweight
Use case	Education, prototyping, data science	WASM microservices, games, tooling, embedded scripts

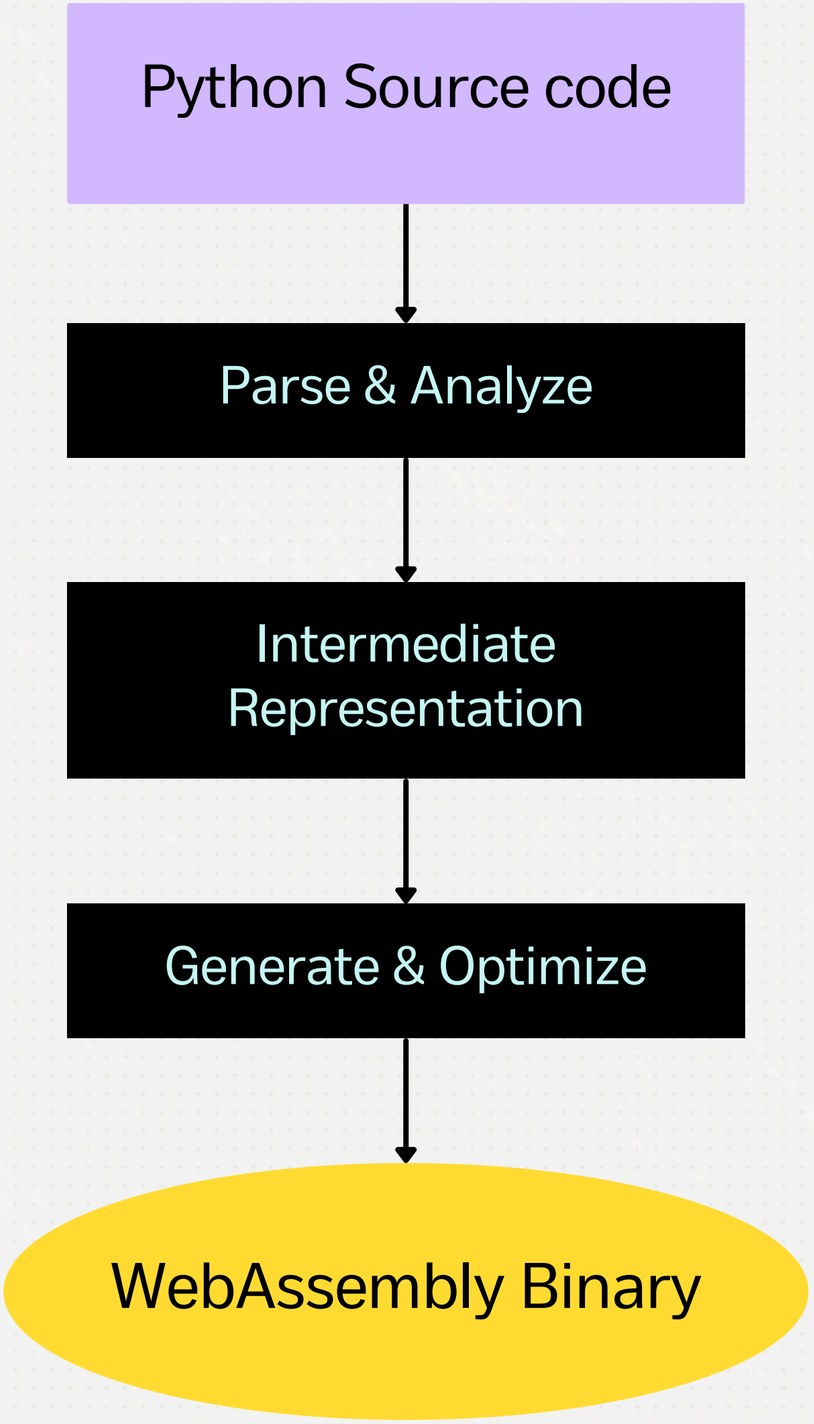
These solutions take up a lot of memory

They don’t directly convert Python to WASM yet.

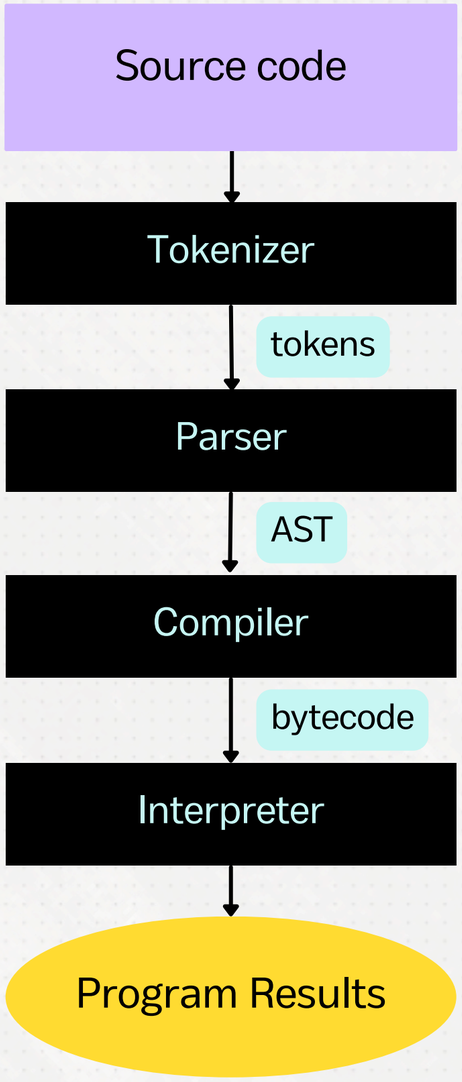
WASPY

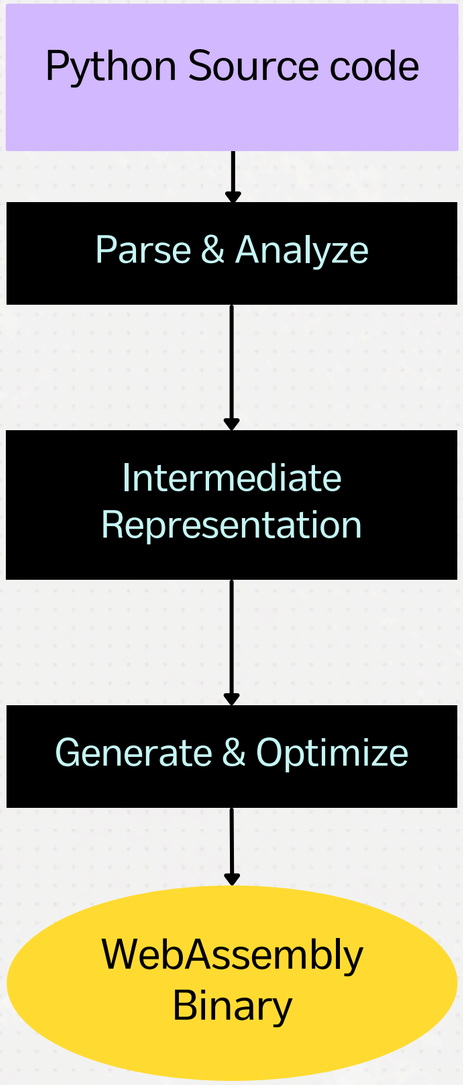
- Waspy is our attempt to transpile python code to Web assembly
- Waspy uses Rust Python engine to convert Python code to AST
- This AST is then parsed into supported statement which can be encoded in WASM

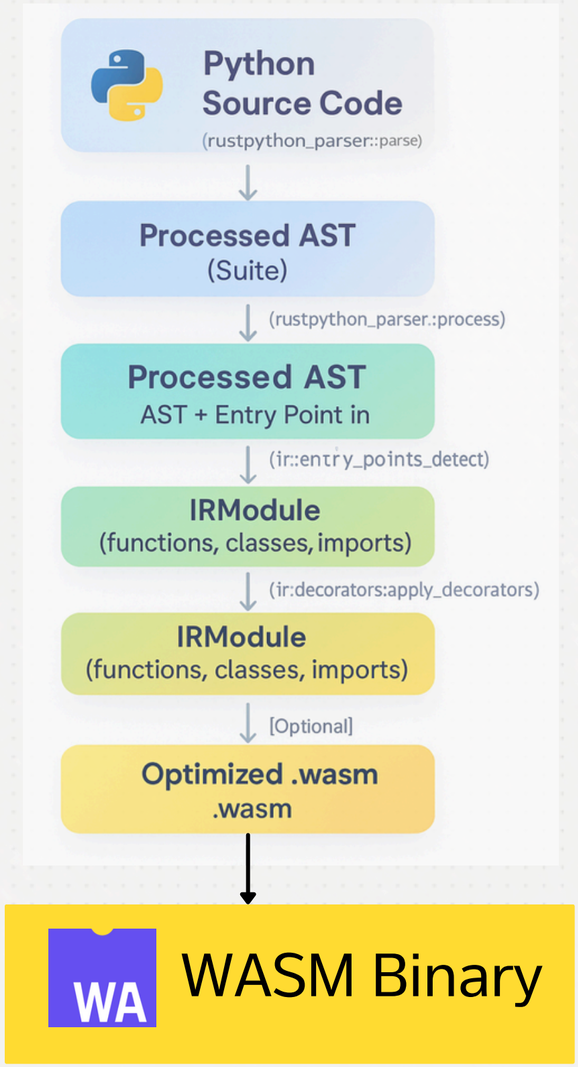
github.com/anistark/waspy



How WASPY works?





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