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ATS Wasm Plugin

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Extending ATS

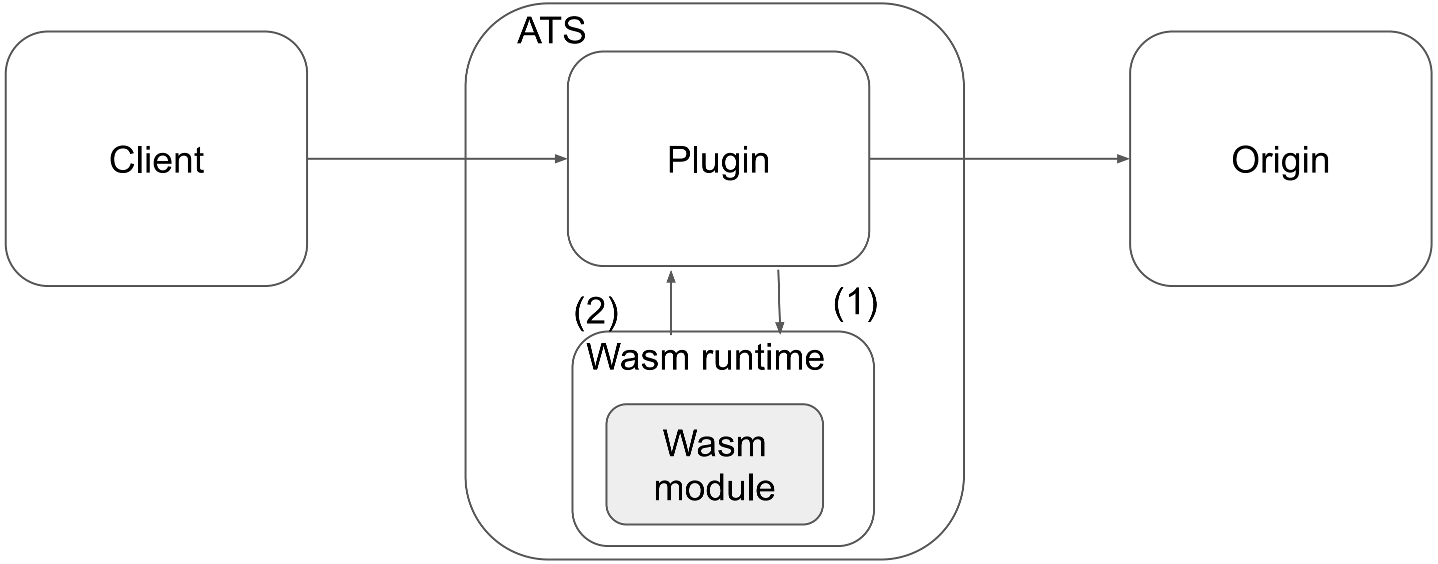
- C/C++ plugins
    - Allow extension of HTTP/TLS handling for connections with clients and origins
    - Steep Learning curve
- header_rewrite scripts / txn box
    - Domain Specific Language - not turing complete, no unit test framework
    - Cover some capabilities of the C/C++ plugins
- Lua plugins
    - Easier to learn a scripting language
    - Cover most of the capabilities of C/C++ plugins
    - LuaJIT FFI allows integration with shared libraries (bindings needed)
    - Not popular - fewer people learning the language / less support for bindings to newer libraries

Proxy-Wasm

- WebAssembly for Proxies
- Spec - https://github.com/proxy-wasm/spec
- Library - https://github.com/proxy-wasm/proxy-wasm-cpp-host
  - Classes for integration with proxy
  - Integrate with different runtime - V8, WAVM, WAMR, Wasmtime, WasmEdge
- SDK - Help to compile programs to wasm modules following the spec
  - C++ - https://github.com/proxy-wasm/proxy-wasm-cpp-sdk
  - Rust - https://github.com/proxy-wasm/proxy-wasm-rust-sdk
  - Available for AssemblyScript, Tiny Go, Zig as well
- Proxy Implementations
  - Envoy
  - MOSN
  - Nginx

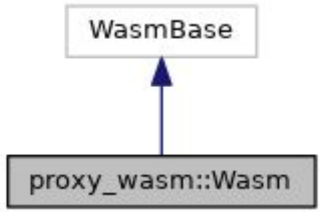
ATS Plugin Architecture

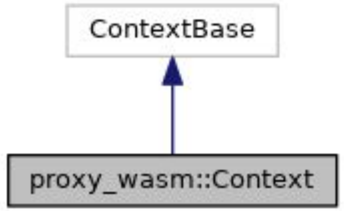
- With handler functions for proxy to call (1)
- Calling API functions that the proxy provides (2)



Code Structure

- Proxy-Wasm library provides base classes of WasmBase, ContextBase
- ATS Wasm Plugin provides extended classes of them
    - Wasm - initializing the runtime, load the module and configuration
    - Context - provide implementations for handler functions and API functions
        - Root Context - created from Wasm during ATS startup
        - Non-root context- created from root context for each transaction





Demo

Demo Summary

- C++ Example - https://github.com/apache/trafficserver/tree/master/plugins/experimental/wasm/examples/cpp
  - Demonstrate HTTP handler functions
  - Demonstrate logging
  - Demonstrate getting / setting HTTP headers
  - Demonstrate getting timestamp
- Rust example - https://github.com/apache/trafficserver/tree/master/plugins/experimental/wasm/examples/rust
  - Demonstrate modules written in another language

Real World Example

- Coraza - https://github.com/corazawaf/coraza
    - Open Source WAF library
    - supports ModSecurity SecLang rulesets
    - Written in Go
- Coraza Proxy WASM - https://github.com/corazawaf/coraza-proxy-wasm
    - WASM filter to be used with Envoy
    - Compiled with TinyGo SDK
- We can download the wasm module and use on ATS with the wasm plugin

Open Source

- Document - https://docs.trafficserver.apache.org/en/latest/admin-guide/plugins/wasm.en.html
- Source Code - https://github.com/apache/trafficserver/tree/master/plugins/experimental/wasm
- To-do list
    - Currently only the WAVM runtime is supported. We need to also support V8, WAMR, Wasmtime, and WasmEdge as well.
    - Need to support functionality for retrieving and setting request/response body
    - Need to support functionality for making async request call
    - Need to support L4 lifecycle handler functions
    - Support loading more than one Wasm module
- More production testing / performance testing

Limitations

- A few things we won’t be able to support in the spec
    - Getting and setting trailer request and response header
    - Getting and setting data in HTTP/2 meta data frame
    - Support on GRPC lifecycle handler functions

Use Cases

- Safety for complex plugins
  - Critical to business
  - Bugs can cause ATS to crash
  - With implementation as Wasm modules, bugs will only cause Wasm runtime to complain
- Allow us to use these plugins with Envoy and vice versa
- Programming in more popular languages - Rust / Go