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Europe 2026

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container2wasm: Running Containers On Wasm Environments

KubeCon+CloudNativeCon EU 2026 - Project Lightning Talk
Kohei Tokunaga, NTT



What is container2wasm?



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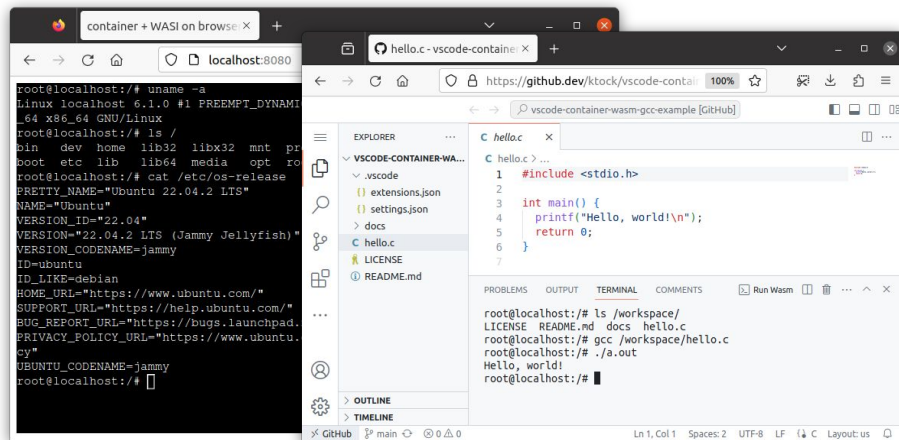
- CNCF Sandbox Project since January 2025
- Runs Linux-based container inside browsers and WASI runtimes using CPU emulators

container

Wasm

```
$ c2w ubuntu:24.04 out.wasm
$ wasmtime out.wasm
root@localhost:/# uname -srn
Linux 6.1.0 x86_64
```

Container on WASI runtimes



Container on browsers

Improved on-browser emulation performance using QEMU



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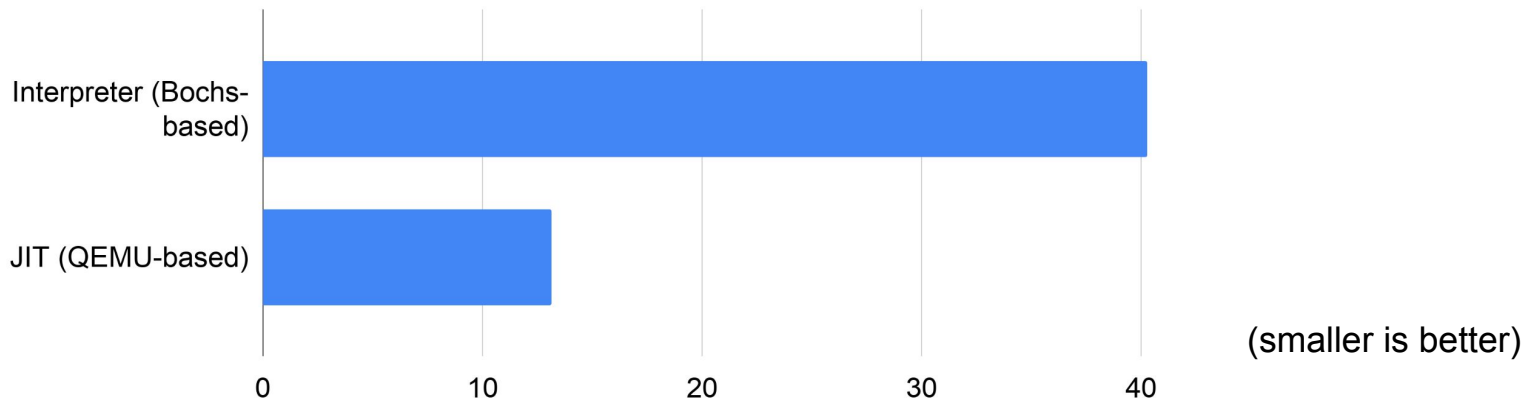


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- Uses a Wasm-compiled QEMU fork with a JIT backend for Wasm ($\geq$ v0.8)
- Discussion is ongoing also in the upstream QEMU for Wasm support
 - [QEMU v10.1](#) (Aug. 2025) supports compiling to Wasm using Emscripten

Gzip compression duration of 10MB data

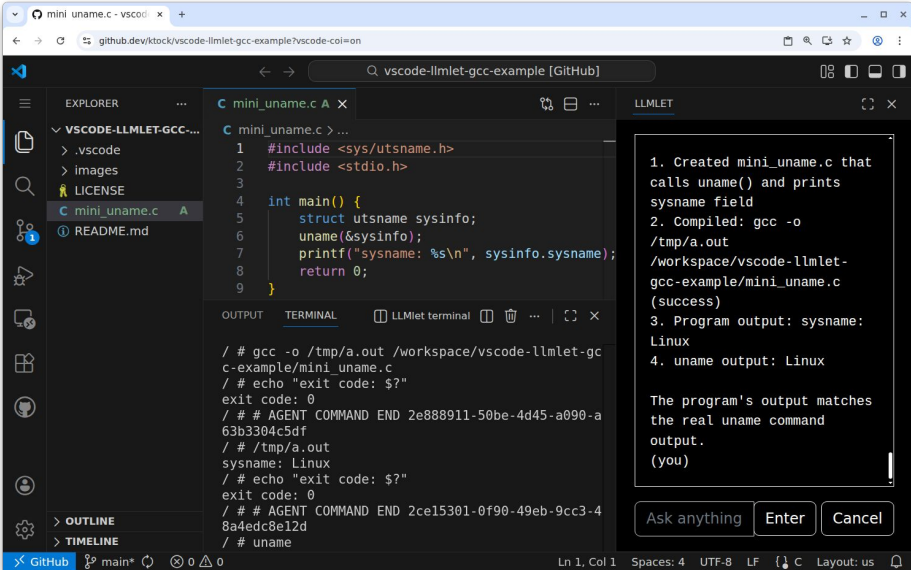


Benchmark is from: Kohei Tokunaga, NTT. "Distributing and Running Containers for Wasm-Enabled Environments". WasmCon 2024

Expanding the use-cases to LLM agent inside browser

- **vscode-llmlet**: An experimental extension of on-browser VSCode
- Runs LLMs on Wasm/WebGPU using a Wasm-compiled llama.cpp
- Container runs inside browser using container2wasm
- Distributed inference across browsers via WebRTC & PeerJS

<https://github.com/ktock/vscode-llmlet>



```
1 #include <sys/utsname.h>
2 #include <stdio.h>
3
4 int main() {
5     struct utsname sysinfo;
6     uname(&sysinfo);
7     printf("sysname: %s\n", sysinfo.sysname);
8     return 0;
9 }
```

```
/ # gcc -o /tmp/a.out /workspace/vscode-llmlet-gcc-example/mini_uname.c
/ # echo "exit code: $?"
exit code: 0
/ # # AGENT COMMAND END 2e88911-50be-4d45-a090-a63b3304c5df
/ # /tmp/a.out
sysname: Linux
/ # echo "exit code: $?"
exit code: 0
/ # # AGENT COMMAND END 2ce15301-0f90-49eb-9cc3-48a4edc8e12d
/ # uname
```

1. Created mini_uname.c that calls uname() and prints sysname field
2. Compiled: gcc -o /tmp/a.out /workspace/vscode-llmlet-gcc-example/mini_uname.c (success)
3. Program output: sysname: Linux
4. uname output: Linux

The program's output matches the real uname command output. (you)

Ask anything Enter Cancel

Remaining issues:

Longer context, faster inference by WebGPU, etc.

Demo: Let Qwen3.5 4B create a mini “uname” command automatically in browser

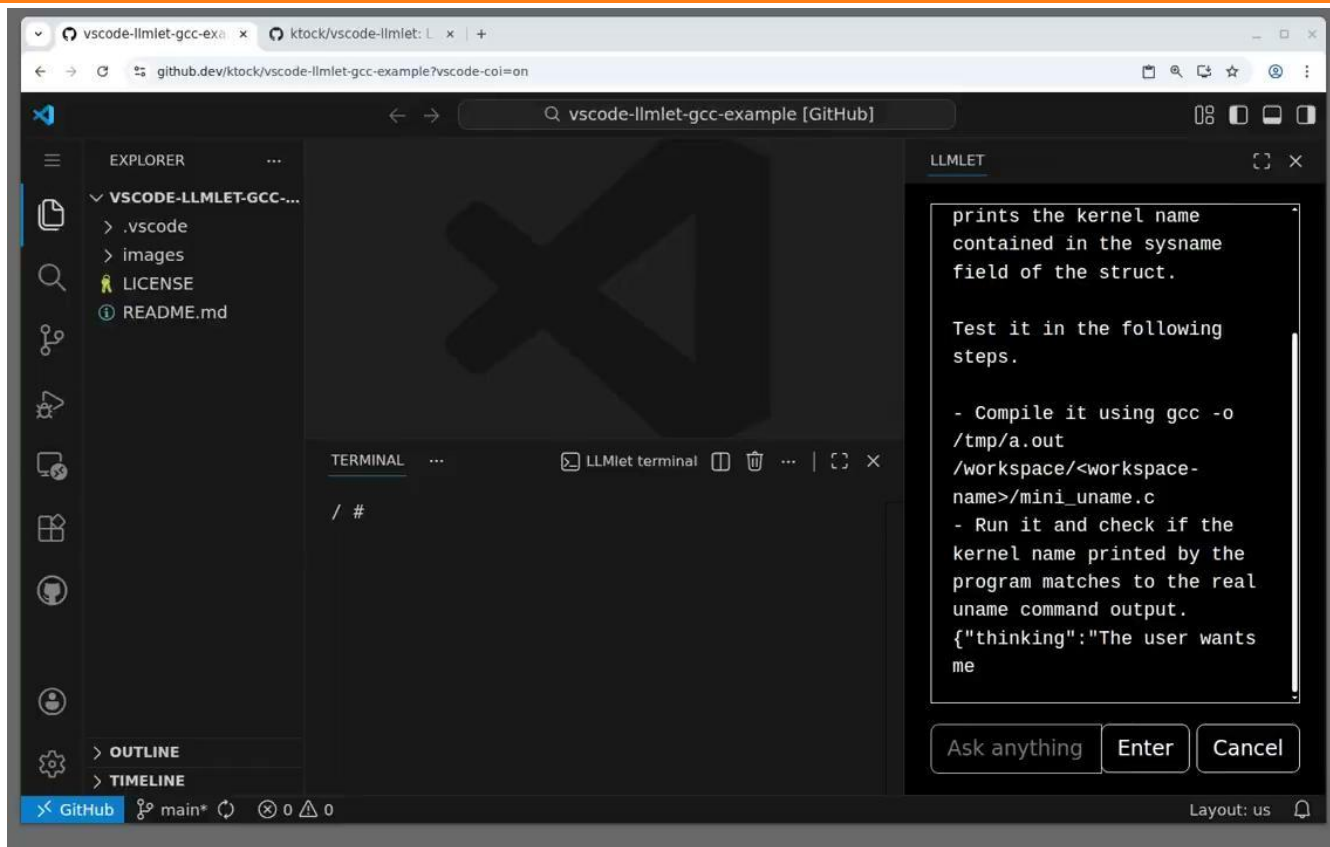


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container2wasm repo:

<https://github.com/container2wasm/container2wasm>

On-browser agent example:

<https://github.com/ktock/vscode-llmlet>