

Browser analytics with C++ and WebAssembly

Compute locally with a small numerical kernel, explicit memory limits and reproducible checks.

In short

- WebAssembly runs compiled C++ functions in the browser, but for a small dataset the transfer overhead may exceed the computation savings.
- Typed arrays should be passed with explicit lengths, input size should be limited, and non-finite numbers should be rejected.
- Native results should be checked against an independent reference with a stated tolerance, and zero variance should be handled explicitly.

01 / Choose the computation boundary

WebAssembly can run compiled C++ functions inside a browser. Kutup Lab uses it for statistics and simple prediction. Parsing, interface state and chart rendering remain in JavaScript. For a small dataset, transfer overhead may exceed computation savings; measure on actual devices before making speed claims.

02 / Specify memory ownership

Pass typed arrays with explicit lengths. Limit input size, reject non-finite numbers and copy results before reusing memory. Never pass a length exceeding the buffer capacity. A fixed upper bound makes the behavior of an educational tool easier to reason about.

03 / Check against an independent calculation

Use fixtures containing a constant series, one sample, negatives, a large offset and an outlier. Compare native results with a reference implementation using a stated tolerance. Handle zero variance explicitly instead of emitting infinity. Show which engine was used when WebAssembly cannot load.

04 / Explain the privacy boundary

Local computation does not make an entire application offline. Lab data stays in the browser, whereas NQ questions go to its answer service. Explain this at the point of data entry. WebAssembly isolation does not replace application-level validation.

Try it

Run a lab scenario and inspect the engine indicator and the method recorded in the downloaded analysis.

References and online guide

[Open the online guide](#)

[WebAssembly security model](#)

Proposed pilot steps do not claim field accuracy. Synthetic examples are not measurements from a production site.