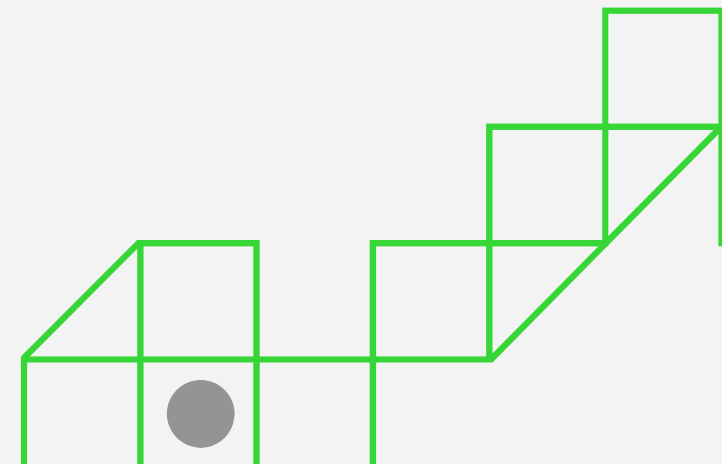# In-Browser Raster Data Processing
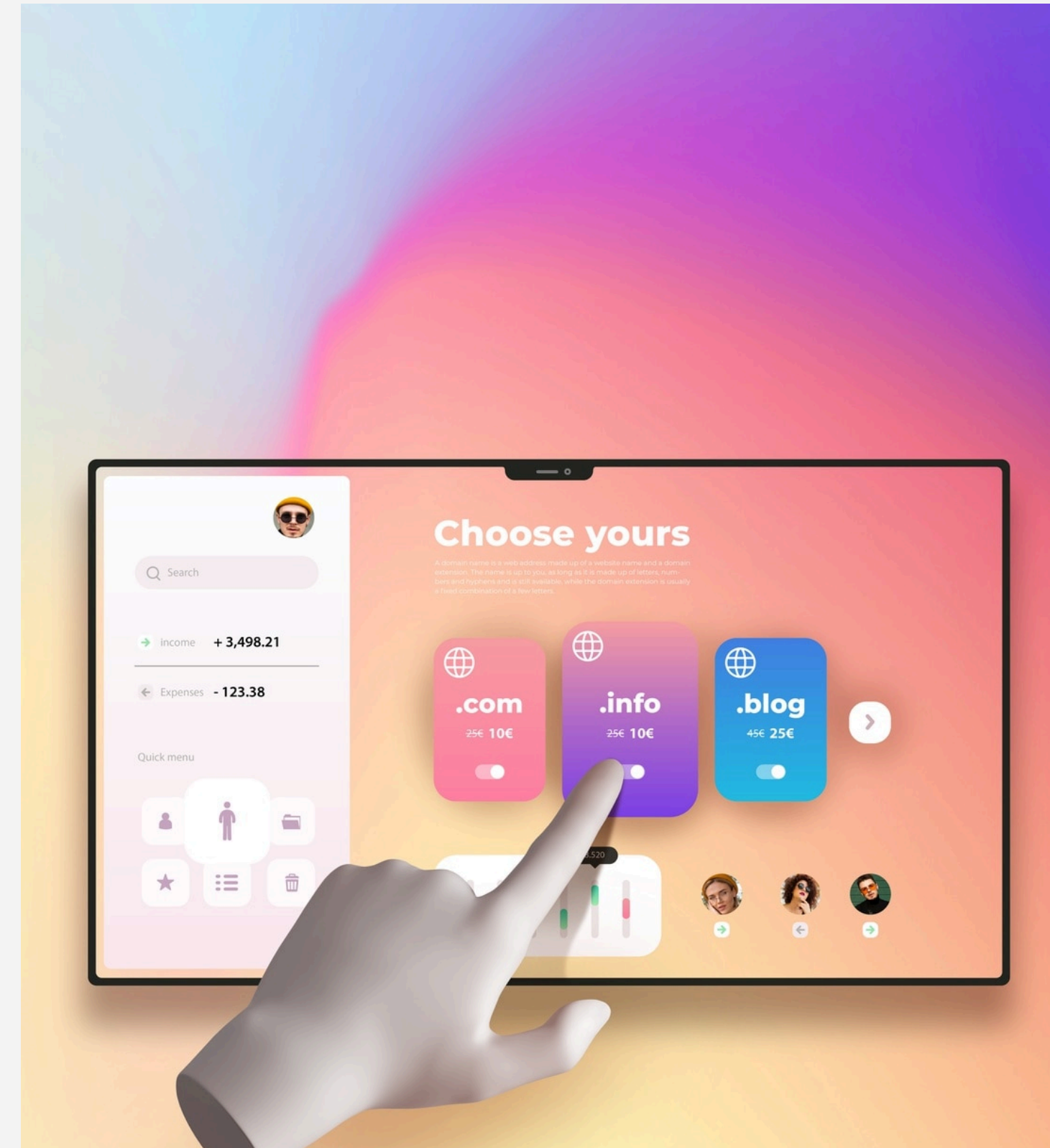
Vishnu Raj Cherukudi Mattuvayil
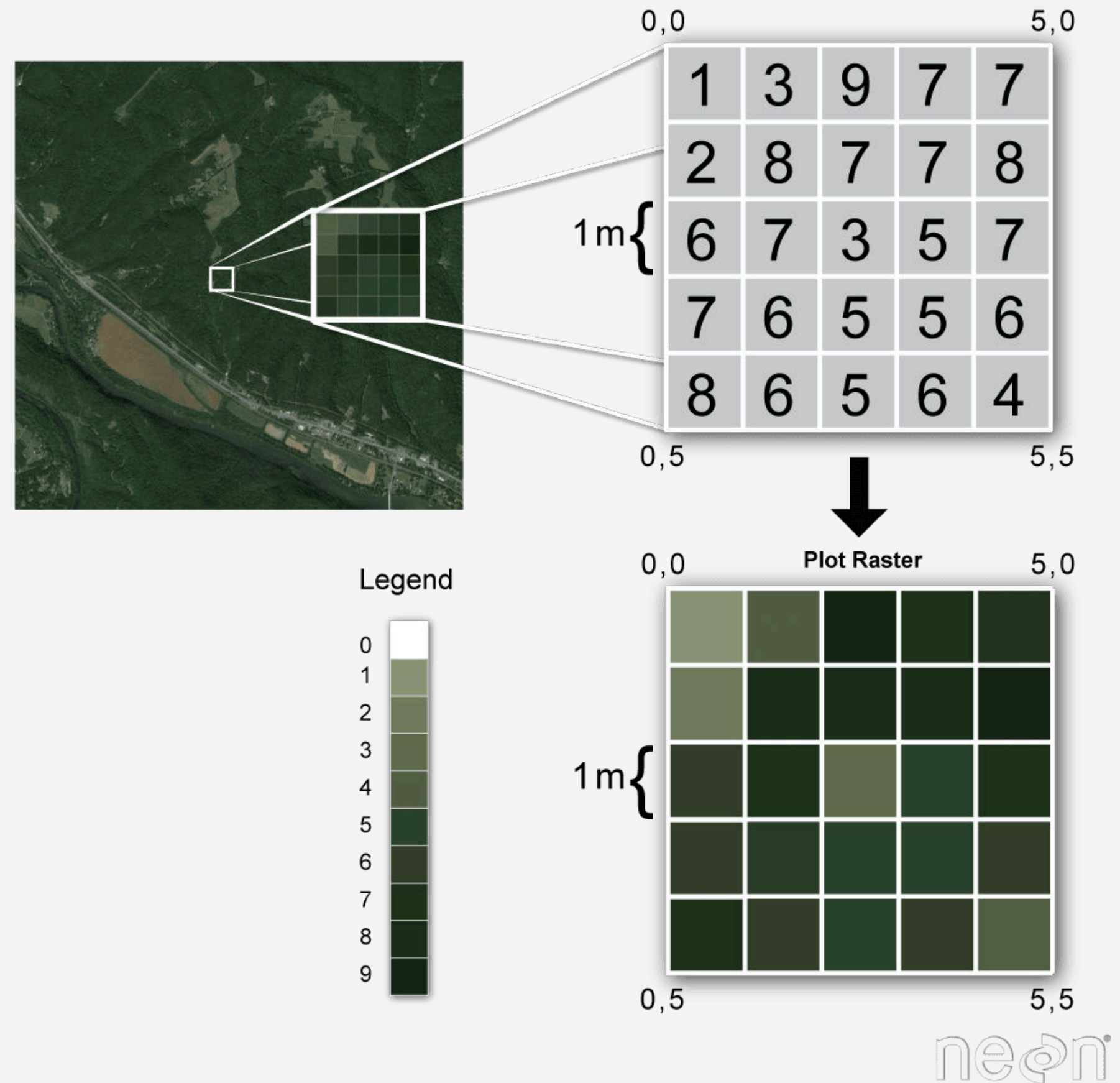
Introduction

- What is raster data?
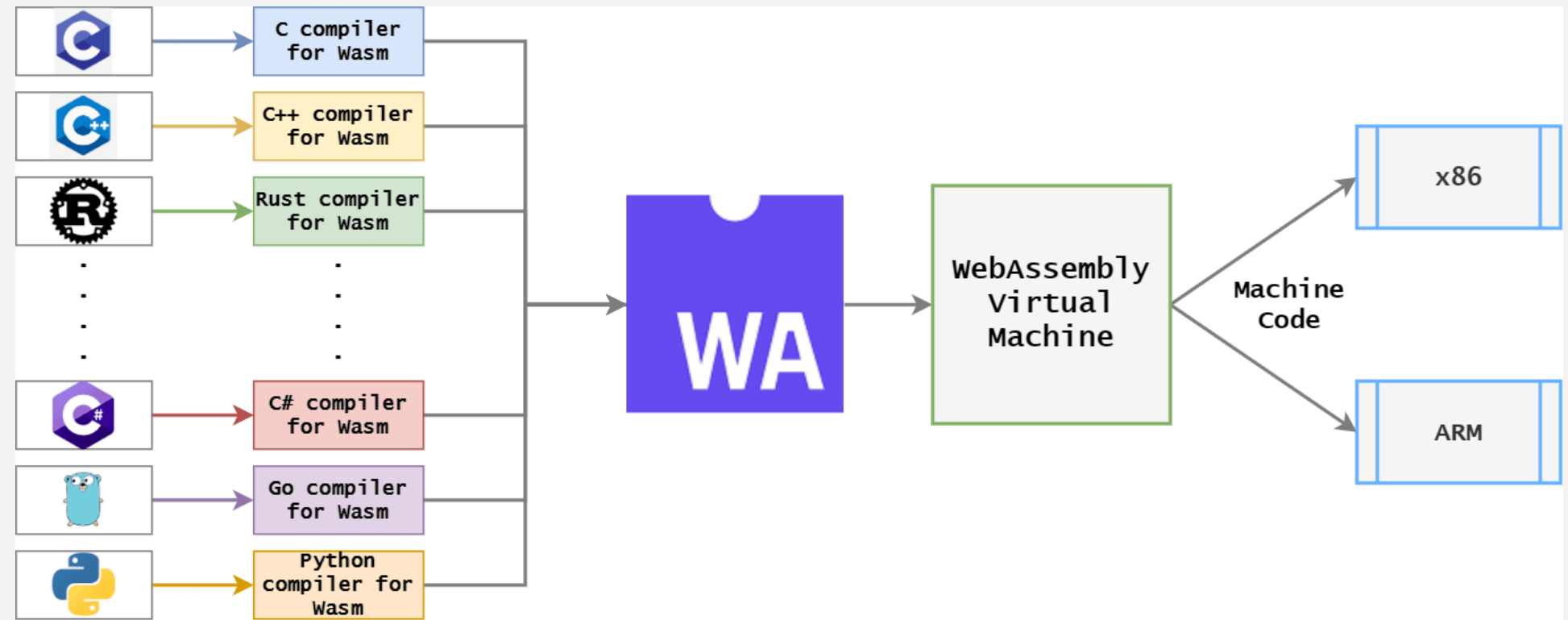- What is Web Assembly(Wasm)?
- Why use Wasm for this project?

Raster Data

- Data from satellites.
- Type of spatial data.
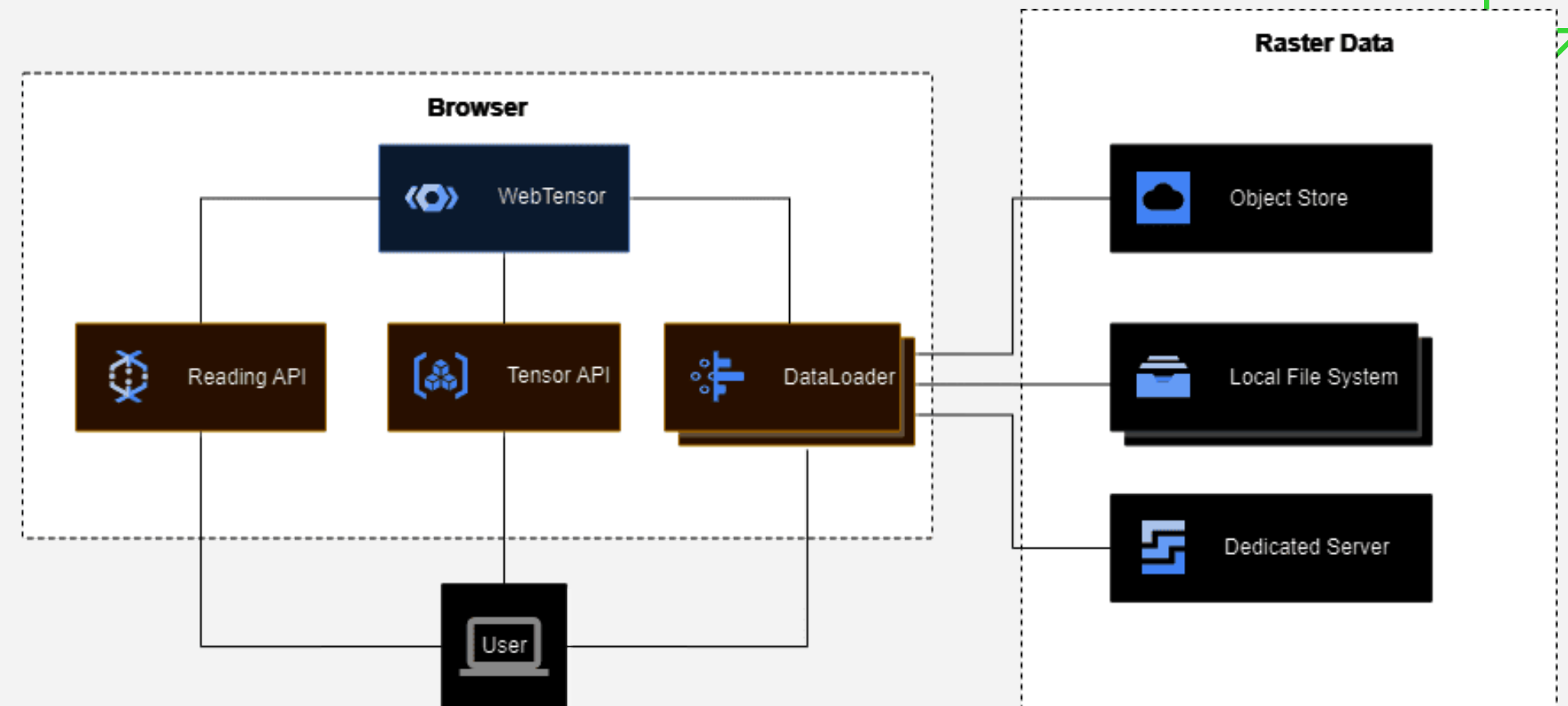- Represented as multi-dimensional arrays.

Web Assembly

- It is a byte code instruction format.
- Linked together with JS and HTML.
- Can be run on modern browser.
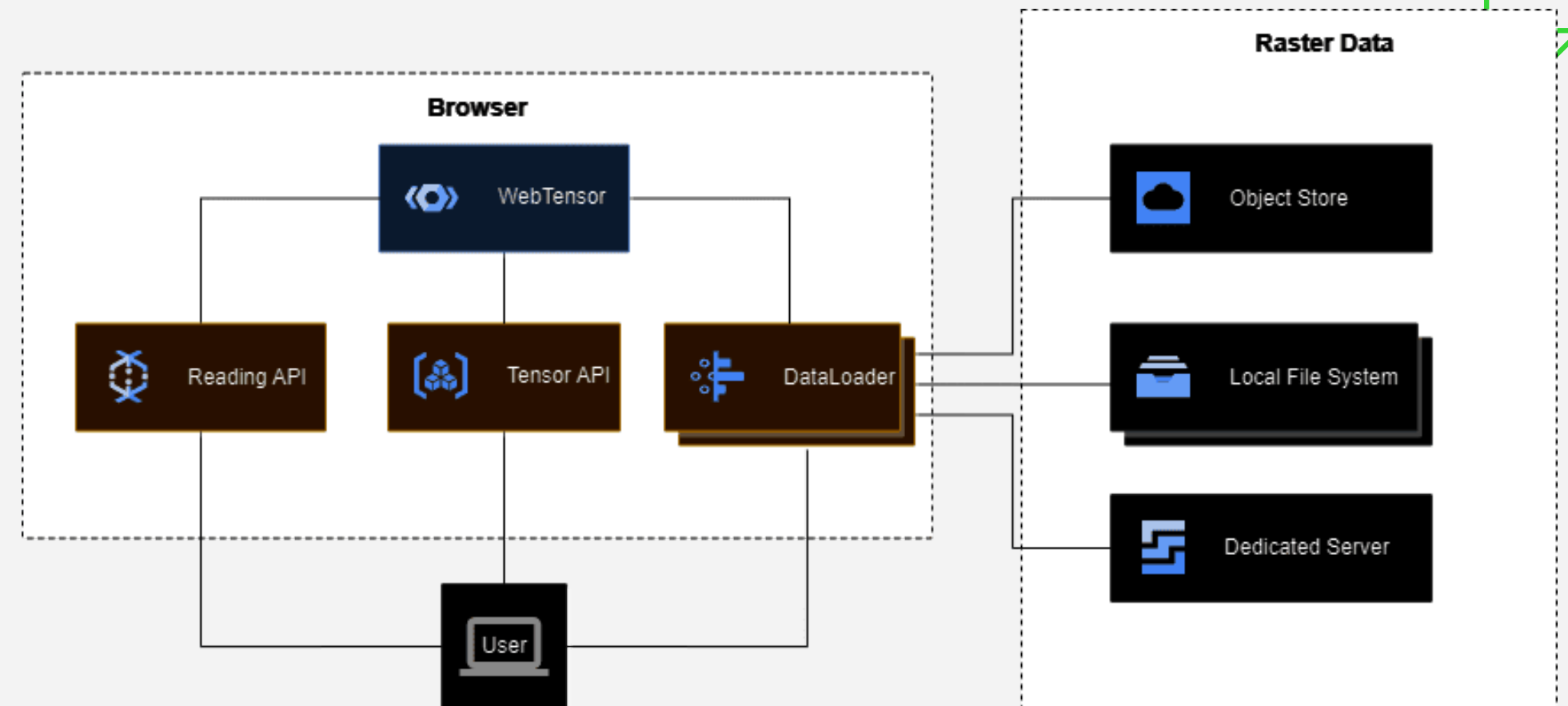- Achieves near native performance.
- Polyglot.

Implementation

- Implement a data loader.
- Implement raster data processing module.
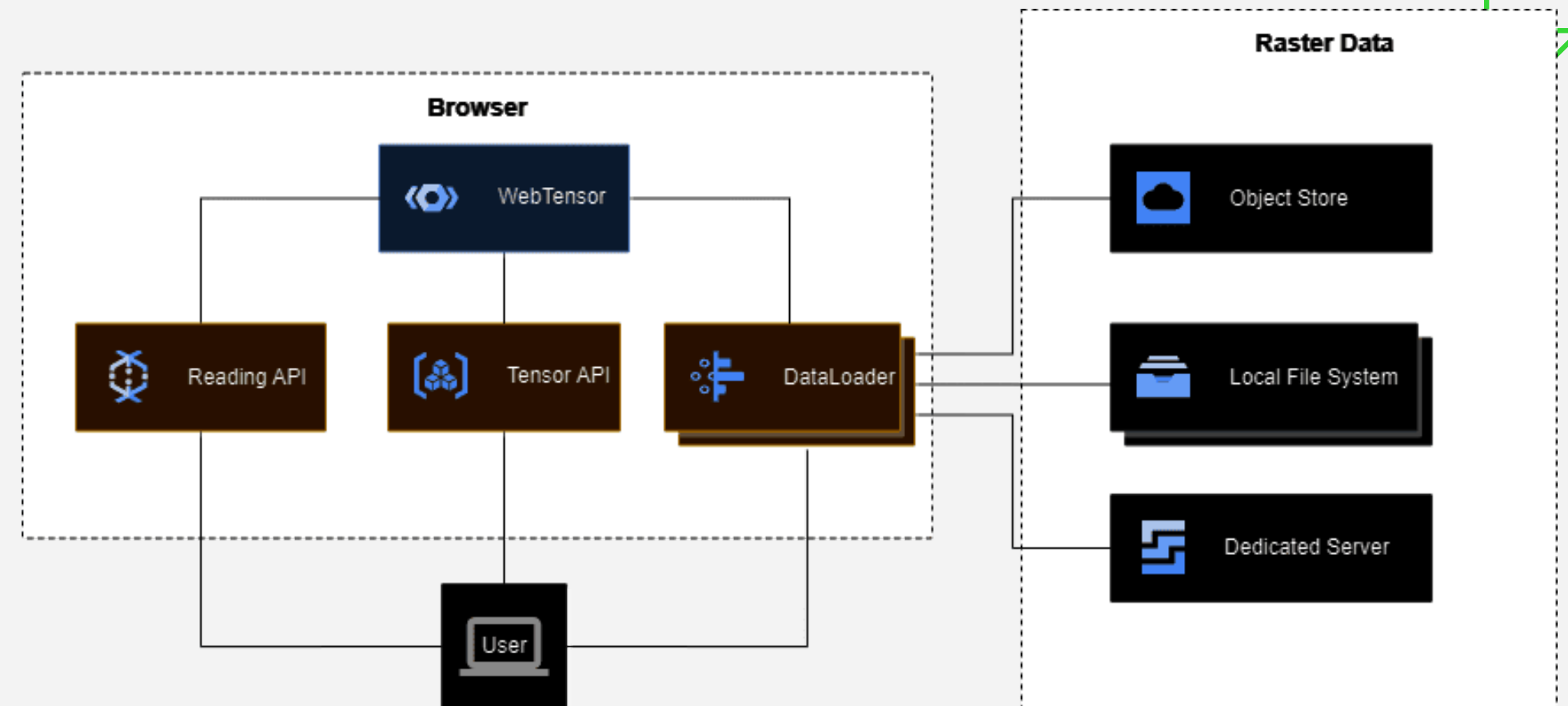- User Interface.
- Emscripten or Pyodide

Data Loader

- File Path or URL
- Coordinate Reference System(CRS)
- Spatial Extent
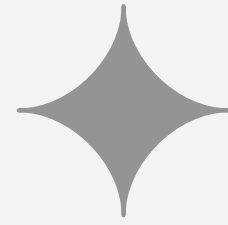- Band Selection
- Memory Size
- Error Handling

Raster Data Processing
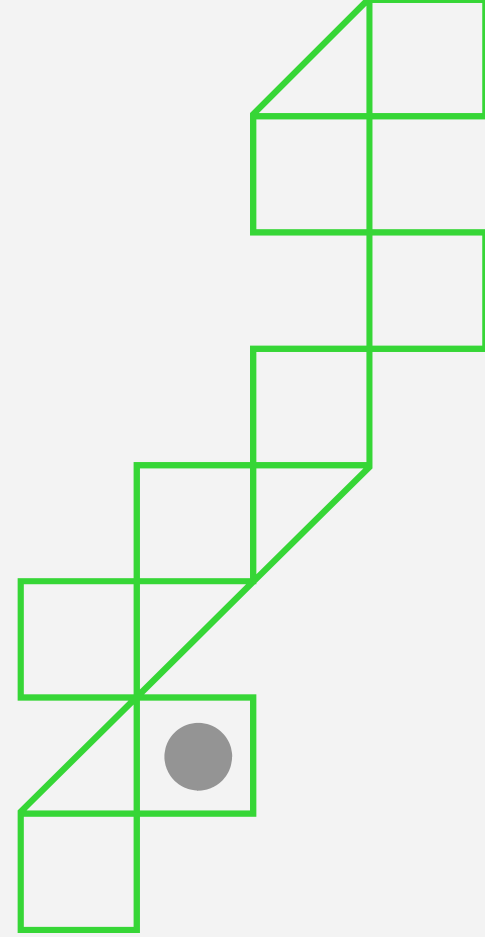
- Operations are to be performed on loaded data.

Tools

- Emscripten for C/C++.
- Pyodide for python.
- Geospatial Data Abstraction Library(GDAL).
- rasterio, rioxarray.
- gdal3.js - GDAL and related tools.

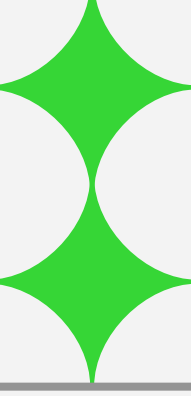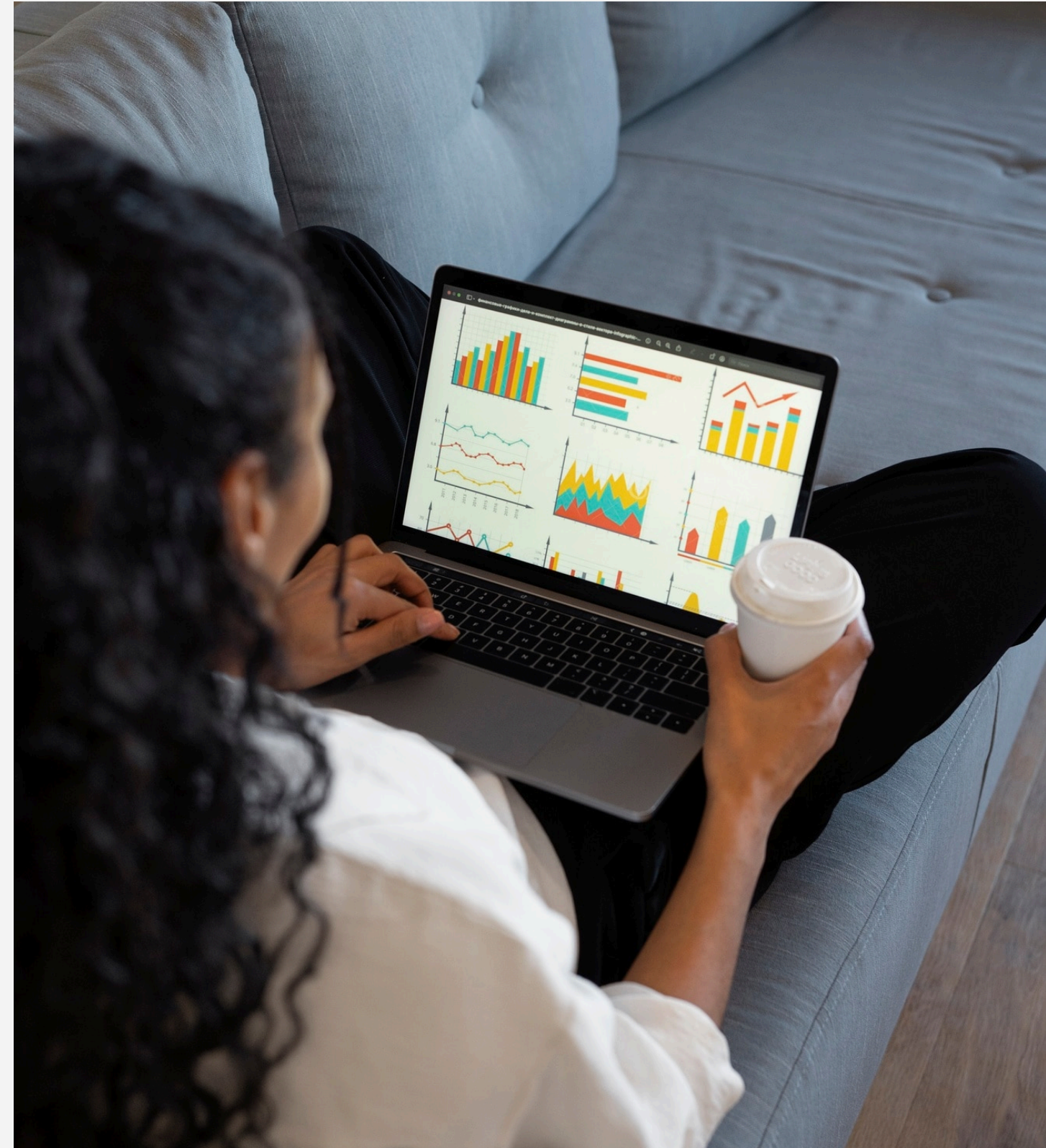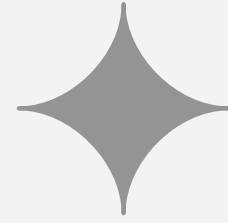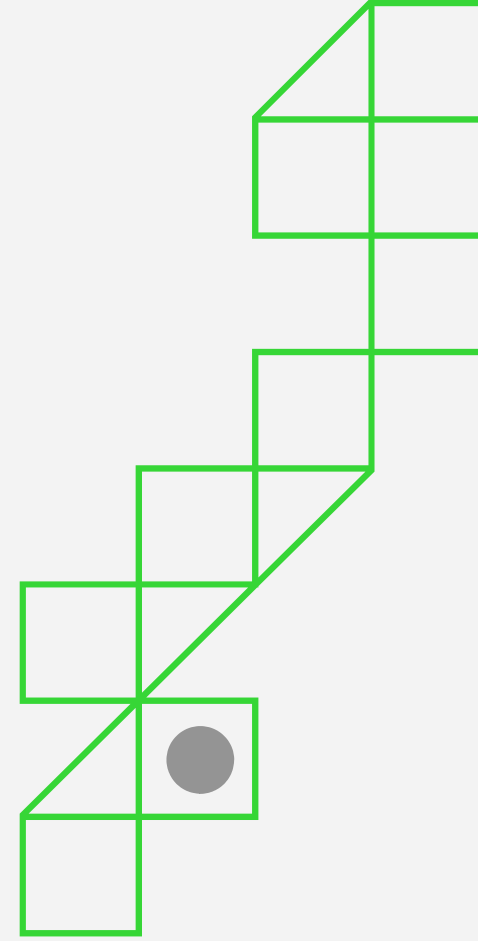# Performance Optimization

Optimizing **web application performance** through in-browser raster data processing. Reducing server load and improving *real-time rendering*.
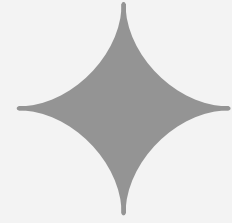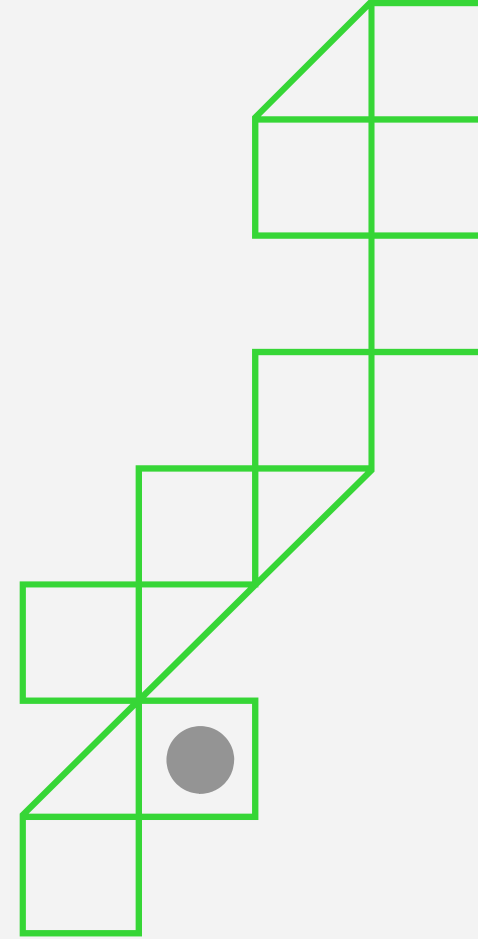
User Experience Enhancement

Enhancing **user experience** through in-browser raster data processing. Providing *seamless interactions* and *instant feedback* to users.
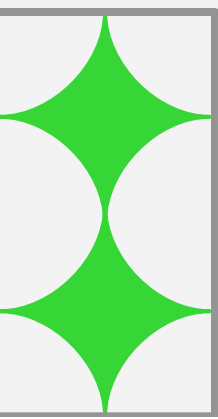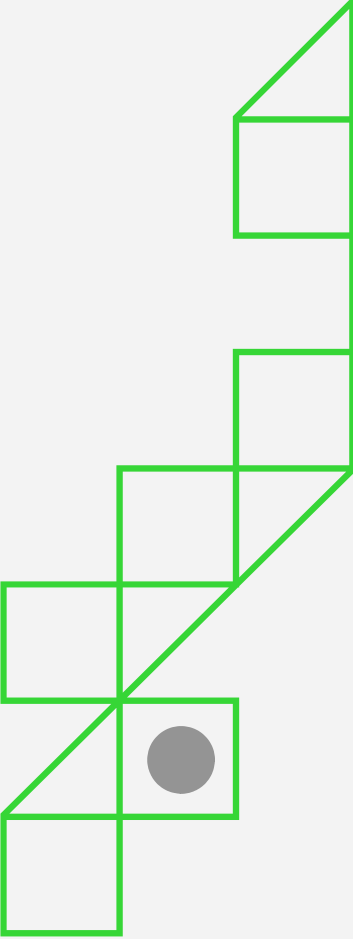
Benchmarking

- Implement the same program without wasm.
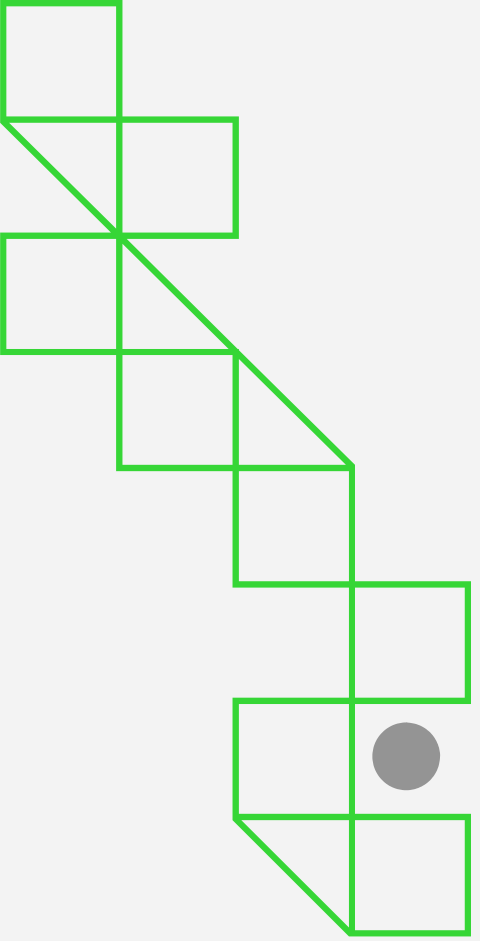- Compare the performance.

CONCLUSION

Since raster data processing requires intensive computing and loading time using wasm reduces the overall execution time with its low level code and client-side rendering.

Thanks!

ANY QUESTIONS?
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