A Study of High Performance Image Processing in the Browser

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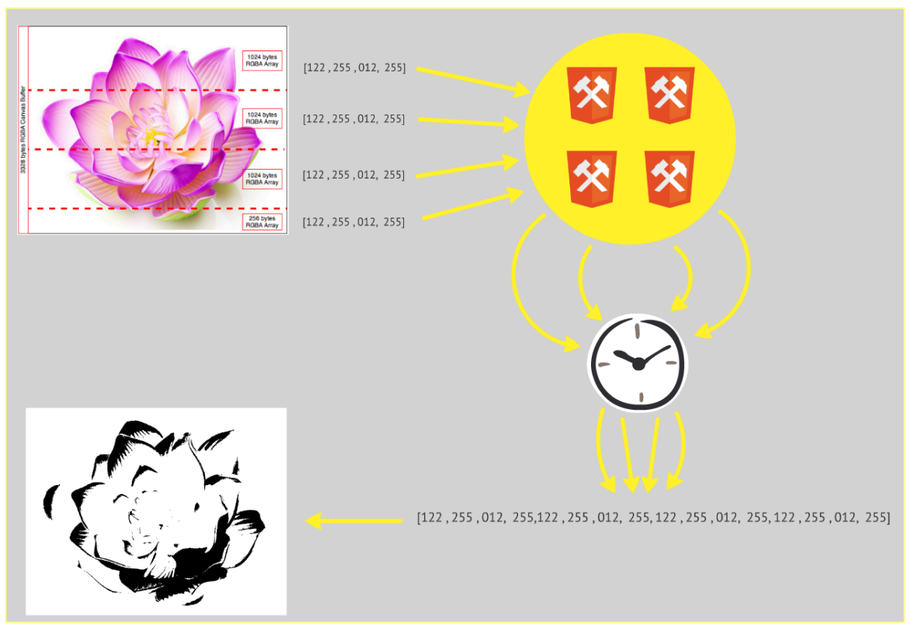
Abstract

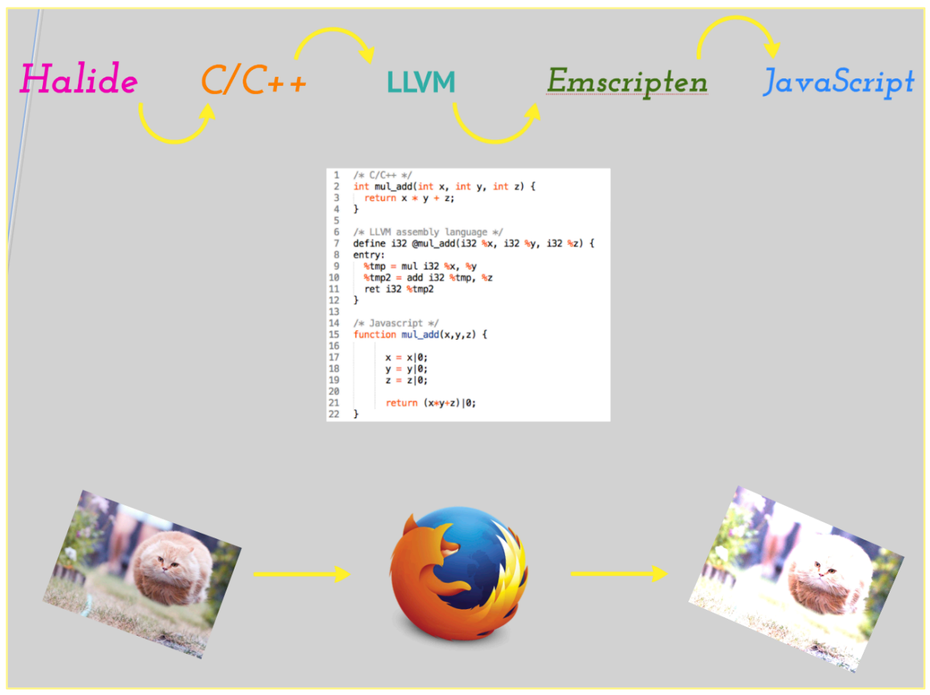
This study explores the possibilities of executing complex image processing algorithms inside the browser at high speed. Using experimental technologies/researches and official standards, this study explores the possibilities of moving native high performance image processing software (such as Photoshop) to a web environment by using the heterogeneous resources of modern computing and recent compiling tools.

Web Workers



Web Workers distributed image processing

Emscripten + Halide

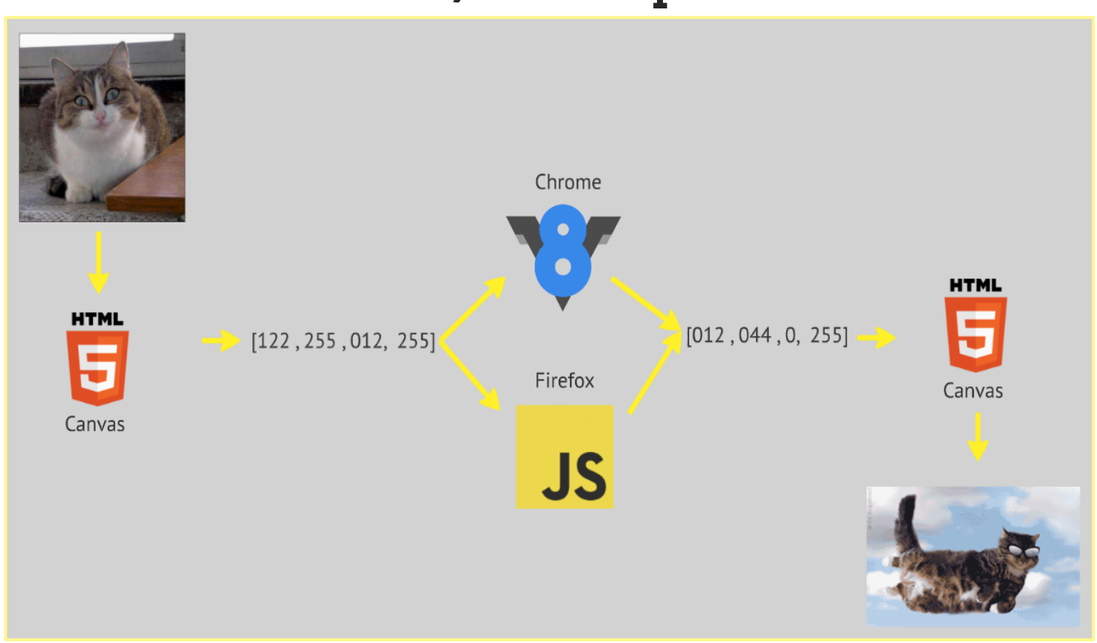


Emscripten and Halide compilation pipeline

WebCL

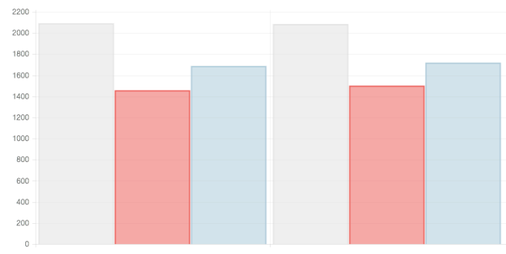
WebCL execution flow

Plain JavaScript

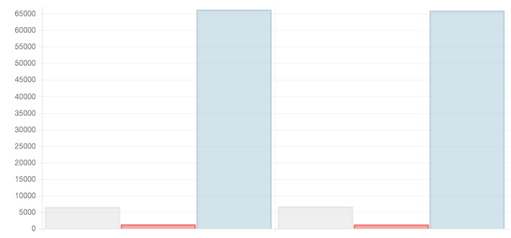


Simple image processing using plain JavaScript

Benchmark



Gray-scale filter



Blur filter

- 269MB of RGBA data (8400px. x 8400px.)
- Grey: Plain JavaScript, Red: WebCL, Blue: Web Workers.
- Lower is better.