



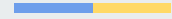
Maker Tools In The Browser

Zero Install, Always Up To Date

FOSDEM '23

Stewart Allen

sa@grid.space



Overview

- Backstory
- Evolving Standards
- Sandbox & Limitations
- Kiri:Moto & Friends
- Technology & Performance
- Future & Roadmap



We Are All Makers

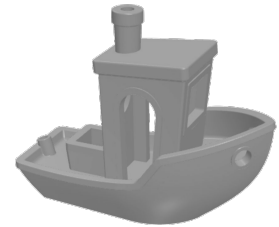
From the frivolous to the profound

Unlike any time in human history

We *all* have access to incredibly powerful tools for creation

Those tools range from the simple to the inexplicable

A great many are free, like our imaginations



The Way Back Web

Not since the 80's has a PC been called a Word Processor

The World Wide Web was conceived for documents (aka browsing), not Apps

Even the earliest web sites struggled with this (forms → new page → lost context)

Stumbling, CSS and other Web Standards took decades to converge on this reality

The “Browser” as an application platform has been decidedly more successful





Desktop vs Cloud vs You

Most desktop apps are inherently insecure, bloated, opaque

Most browser-based apps rely on compute resources in “the Cloud”

Both often have some form of data tie-in that limits access and portability

We need / we want / we deserve fully local, secure, highly performant apps

Browsers are the ultimate app VM that (*should*) allow write once, run everywhere





Progressive Web Apps

Installable On All Devices (Desktop, Mobile)

Runs Offline And Updates When Online

Does Not Require An App Store

App-Like Customization With Icons And File Associations

WebAssembly, WebBluetooth, WebUSB, WebSerial, Clipboard, and more

Manifest

Service
Worker



The Pros

Faster Development and Iteration

More Portable and Consistent UI

Easier to Inspect and Debug

Smaller Footprint, Less Code

More Secure

The Cons

Fewer 3rd Party Libraries

Native Networking / Local Network Access*

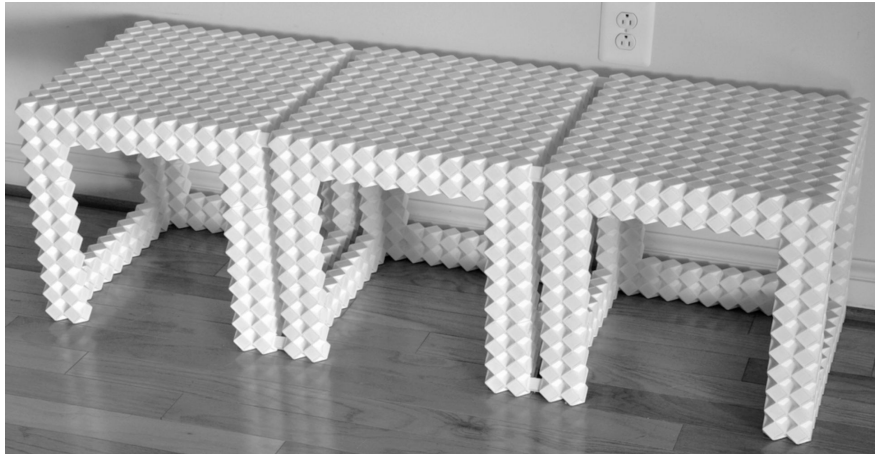
Long Term Storage / Data Persistence*

Language Diversity*

Not Suitable for HPC*



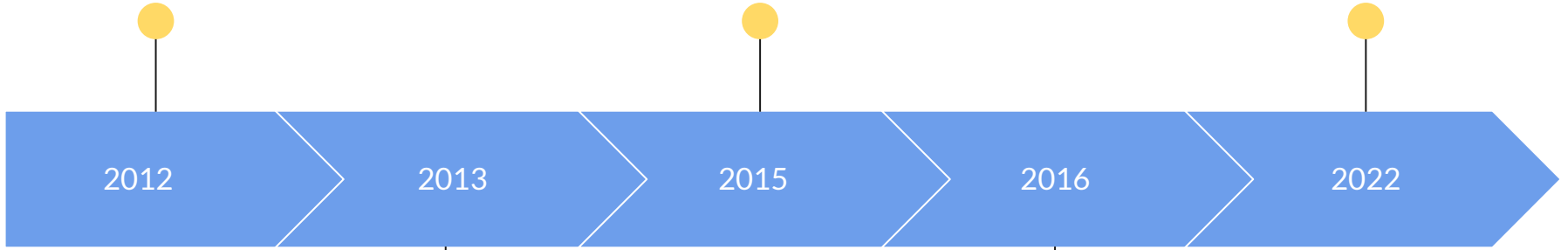
How Hard Could It Be?



Kiri:Moto

GridBot

Mesh:Tool
Carve Control



2012

2013

2015

2016

2022

Makerbot Print Farm

Grid:Host Sender

Integrated into Onshape

Added CAM

Kiri:Moto

Kiri-e

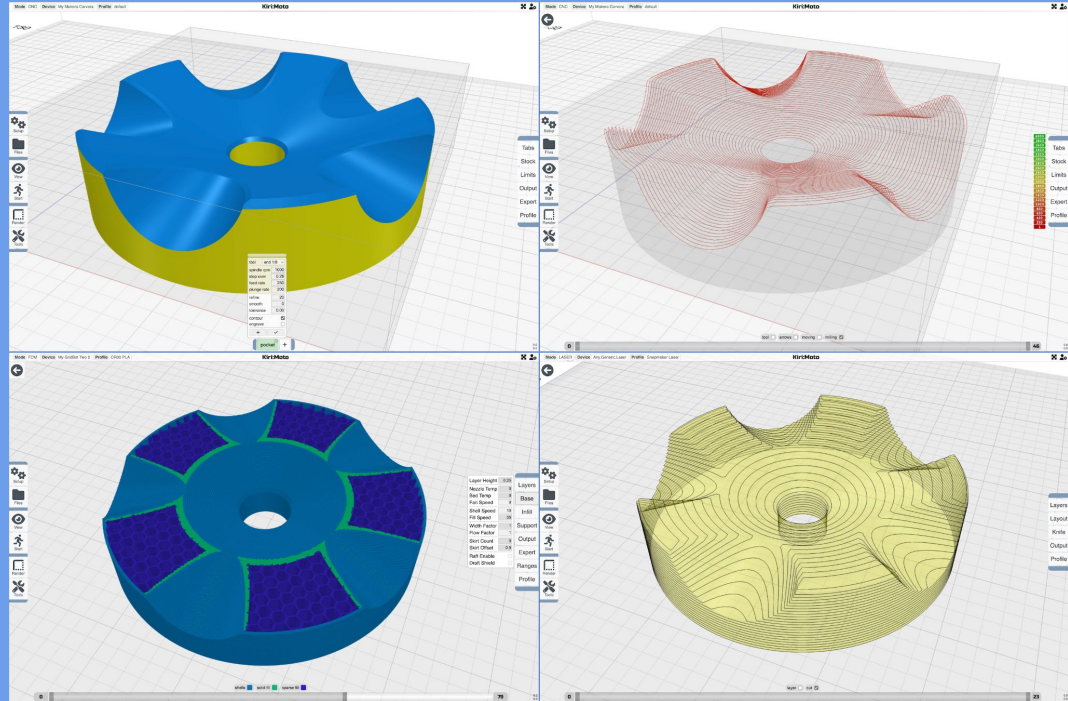
Japanese art of paper cutting

Moto

Modeling Tool

GitHub

github.com/GridSpace/grid-apps





App Flow

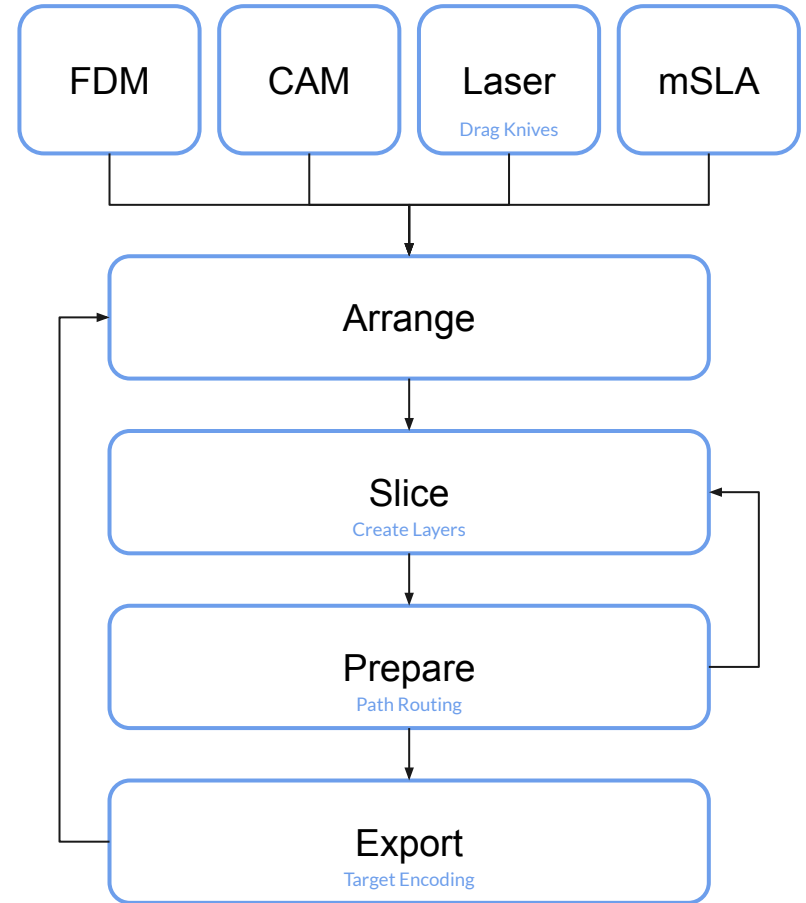
Select Device Mode (E)

Arrange (A)

Slice (S)

Prepare (P)

Export (X)



Code Structure

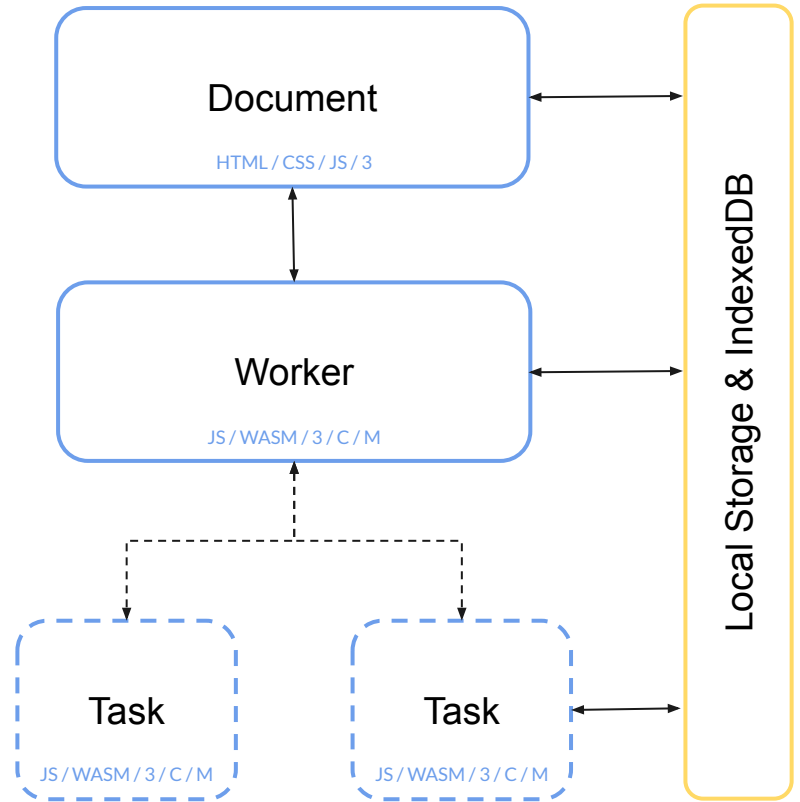
100% Browser Local

JS & WASM

ThreeJS

Clipper

Manifold*





Demo

Kiri:Moto

Engine API

Frame API

Onshape + Kiri:Moto



Future Work

More WASM, Shared Data, Parallelization

Custom Shaders in ThreeJS

5 axis FDM

2D and 5 axis CAM

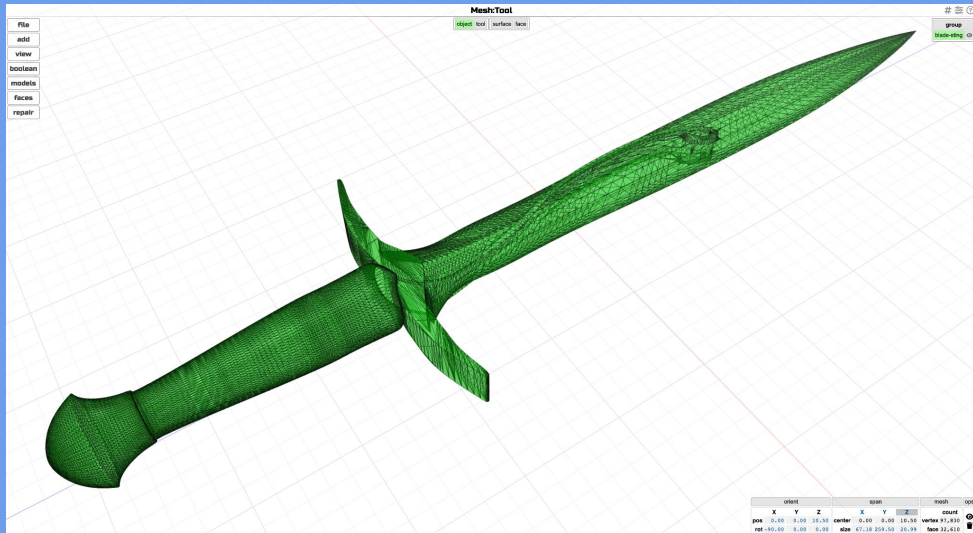
Spooling to more targets

Integrated GCode sender (again)?

Mesh:Tool

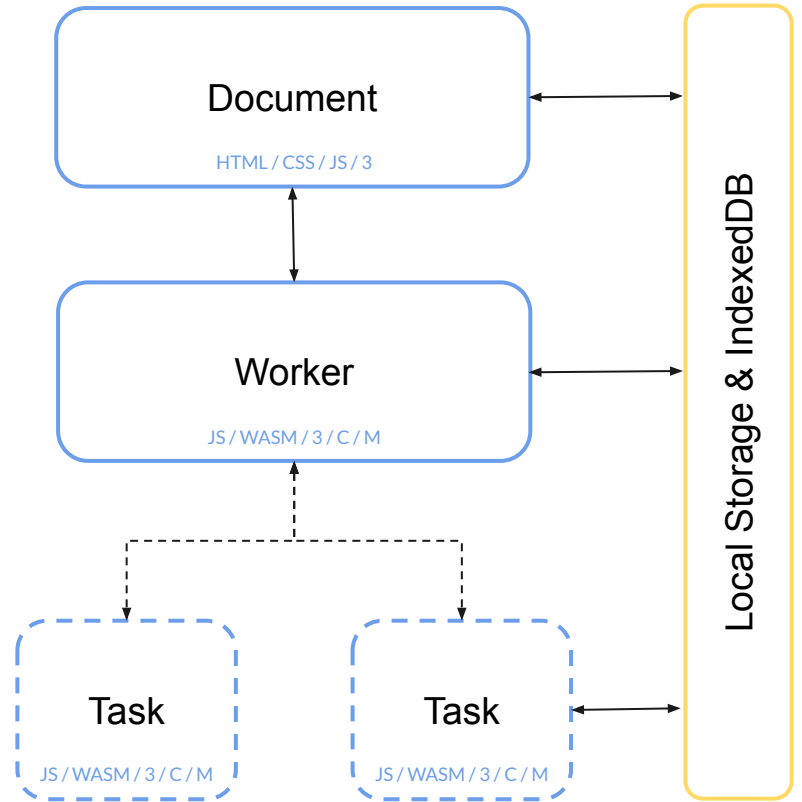
GitHub

github.com/GridSpace/grid-apps



Code Structure

Mesh:Tool



Carve Control

GitHub

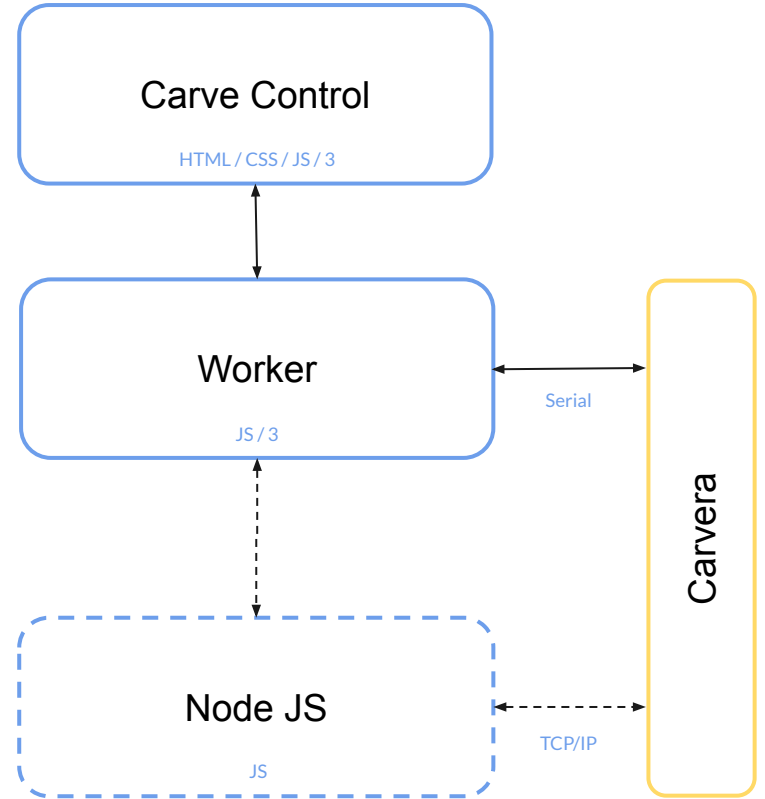
github.com/GridSpace/carve-control

The screenshot displays the Carve Control software interface, which is used for controlling a CNC machine. The interface is divided into several sections:

- Top Panel:** Shows the current status of the machine, including coordinates (X: 359.395, Y: 233.765, Z: 103.220), feed rate (F: 3000), spindle speed (S: 0), and tool length (L: 0.0). It also includes buttons for 'reset', 'unlock', and 'stop'.
- Left Panel:** Contains a file browser with 'sd' and 'gcodes' folders, and a list of example files: 'case-1.nc' (499.523), 'case-2.nc' (577.635), and 'sigil-3.nc' (4.381). Below this is a 'run' button and a numeric keypad with 'Y-', '10', 'X+', and 'Y+' buttons.
- Center Panel:** A 3D visualization of a rectangular workpiece with a yellow wireframe box indicating the current tool position and path. The workpiece has a red square on its surface.
- Right Panel:** A control panel with various settings:
 - start/cancel** buttons.
 - use anchor** section with radio buttons for 'use existing', 'anchor A (3 axis)', 'anchor B (3 axis)', and 'anchor C (4 axis)'.
 - anchor offset** section with input fields for X (0) and Y (0).
 - probe z** section with radio buttons for 'anchor', 'none', and 'grid', and input fields for X (3) and Y (3).
 - bounds** section with a checkbox for 'run box'.
 - stock** section with input fields for X (80), Y (80), and Z (25).
 - A checkbox for 'detected'.
- Bottom Panel:** Includes 'log' and 'hold/resume' buttons.

Code Structure

Carve Control





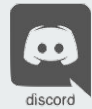
Thank You

FOSDEM '23

Stewart Allen

sa@grid.space

social.makerforums.info/@stewart



Grid  Space