Demo: VoxelCAD

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What is VoxelCAD?

• Collaborative voxel-based CAD tool
• In the browser
• Programmable with a functional DSL
• Written in Elm + Haskell (+ TypeScript)
• Work in progress
Some context

• People use Minecraft as an artistic canvas
• These tend to get very big
Some context

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• These tend to get very big

• There are some tools, but they are not very intuitive:
  - clunky
  - slow
  - no immediate feedback
Functional DSL

- Pure - no global state, idempotent scripts
- Nicely composes
- Easy to understand, even without programming knowledge
- “We’ll write a parser later” => lisp
DEMO
Constructive Solid Geometry

type Primitive
= Cylinder
  | Sphere
  | Cube
  | Cone
Combine primitive solids with boolean operations

type $Op$

- Union
- Intersect
- Subtract
type Construction
  = Leaf Transform Primitive
  | Combine Transform Op Construction Construction

type Transform = …
Hardware-accelerated voxelisation
A LONGER DEMO
Thoughts on Elm

- New programming language for web applications
- Similar to Haskell
- But there are some inconvenient differences
- Predictable run-time system
data Transformation
    = Scale Vec3 Vec3
    \| Rotate Float Vec3 Vec3
    \| Translate Vec3
deriving (Generic, FromJSON, ToJSON)
data Transformation
    = Scale Vec3 Vec3
    | Rotate Float Vec3 Vec3
    | Translate Vec3

deriving (Generic, FromJSON, ToJSON, Elm)
Future work

• More usable editor (auto-completion, syntax highlighting…)

• A typed DSL

• More “mouse-support” (for curve control points, for example)

• Could be used for teaching programming: your program builds things in Minecraft!
Thank you