



**T** TigerBeetle

# FLOOOX WORLD TOUR

13 CITIES | 6 DAYS

Introducing: TigerBeetle Racer



# R A C E R

Press a key to continue ...

```
{  
    "time_ms": 100,  
    "transactions": 136,  
    "latency_ms": 215.691  
},  
{  
    "time_ms": 200,  
    "transactions": 133,  
    "latency_ms": 305.578  
},
```

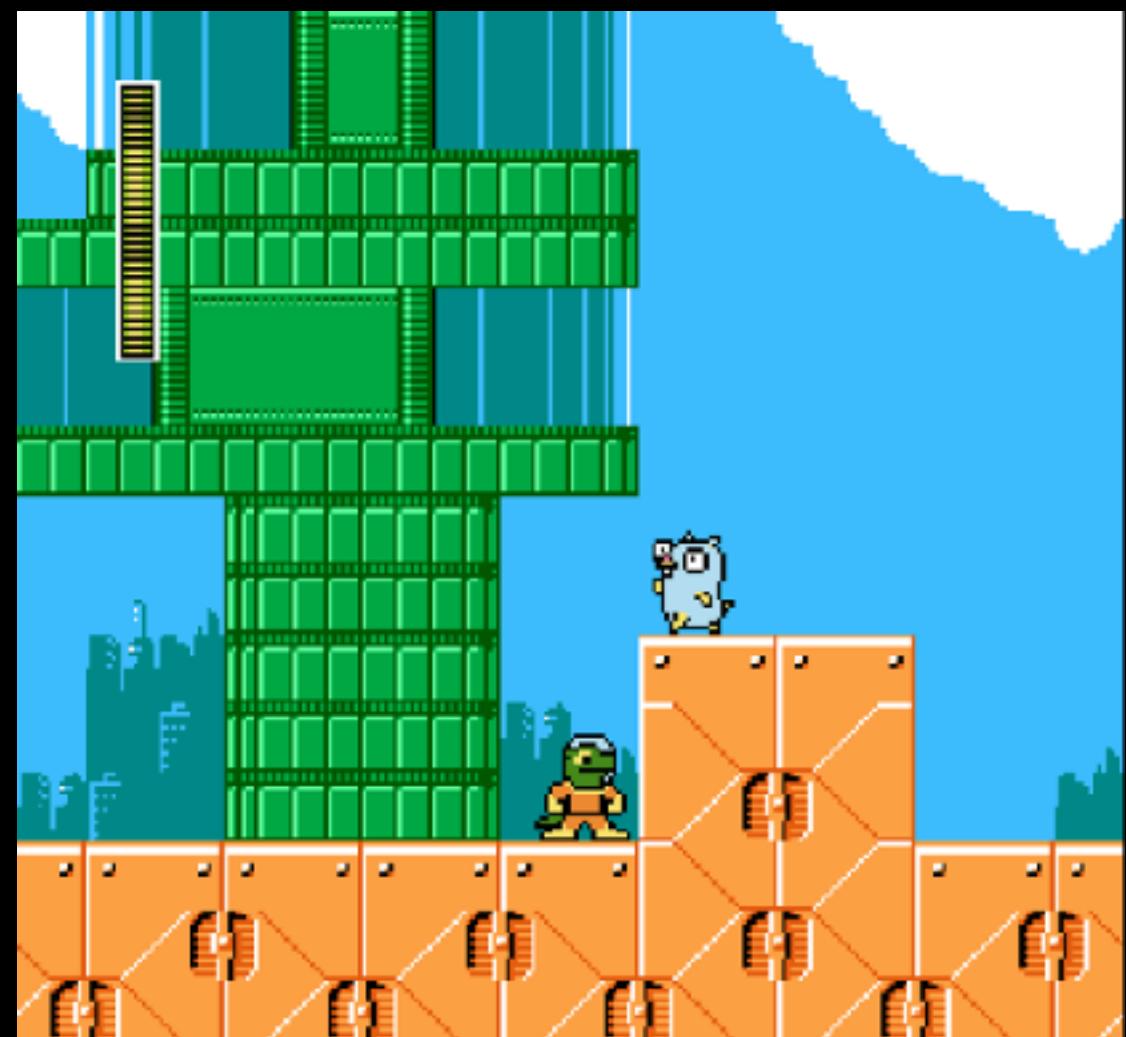
# How we built Racer

# Outline

- About - How come a database company makes games?
- Story - What led to the creation of Racer
- How - Techniques used in the making of Racer

# About Fabio

- Always had an interest in games
- Discovered Zig in 2019
- Met Joran at first Zig meetup in Milan 2023

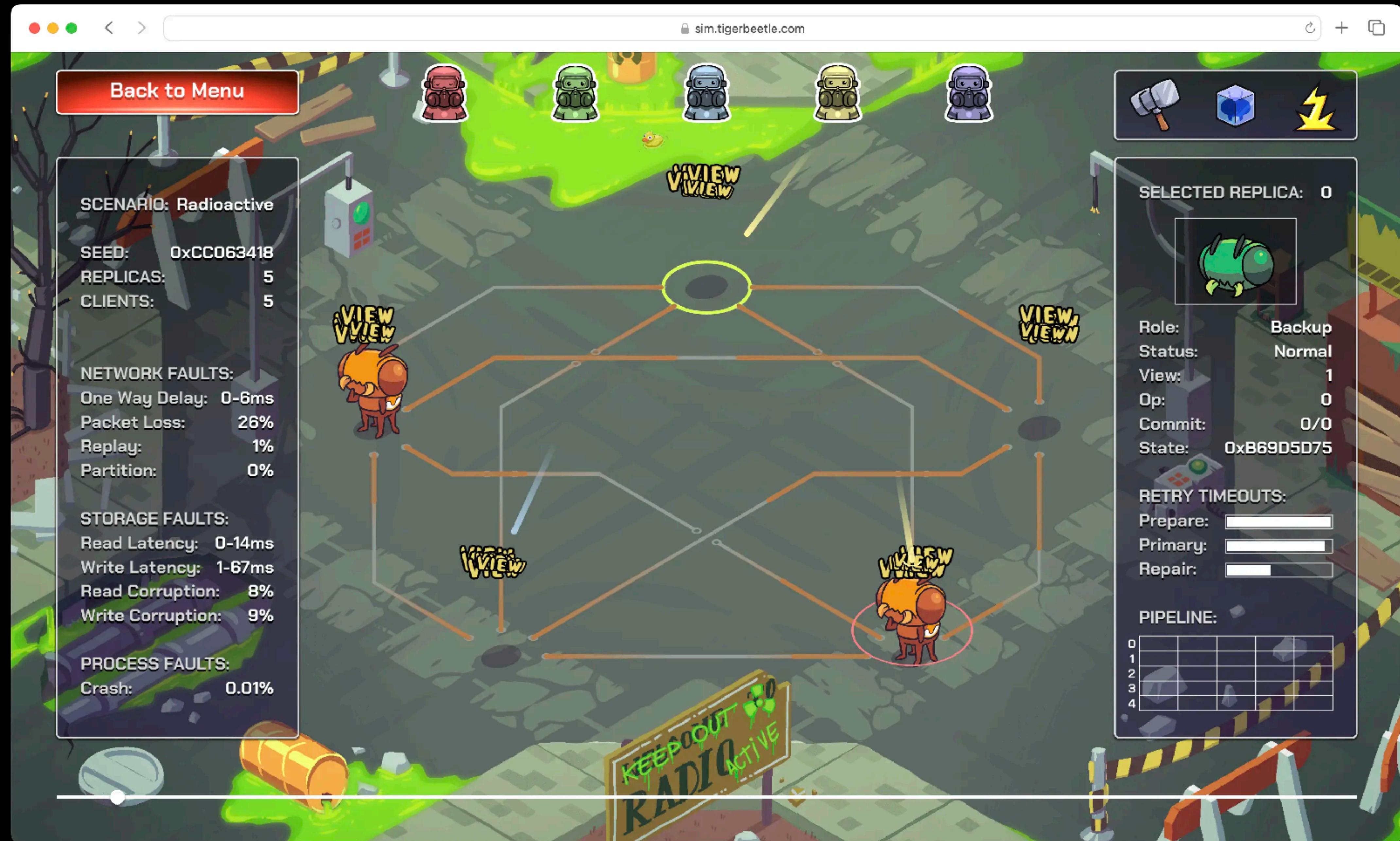


● fabioarnold@localhost ~/D/t/tigerbeetle (main)> ./zig/zig build vopr

SEED=1312833083777694941

```
replicas=1
standbys=0
clients=1
request_probability=71/100
idle_on_probability=3/100
idle_off_probability=15/100
one_way_delay_mean=51.484ms ticks
one_way_delay_min=26.208ms ticks
packet_loss_probability=5/100
path_maximum_capacity=15 messages
path_clog_duration_mean=2.785s ticks
path_clog_probability=1/100
packet_replay_probability=2/100
partition_mode=uniform_partition
partition_symmetry=asymmetric
partition_probability=0/100
unpartition_probability=6/100
partition_stability=192 ticks
unpartition_stability=12 ticks
read_latency_min=7.826ms
read_latency_mean=60.283ms
write_latency_min=4.844ms
write_latency_mean=569.737ms
read_fault_probability=8/100
write_fault_probability=7/100
crash_probability=2/10000000
crash_stability=408 ticks
restart_probability=2/1000000
restart_stability=215 ticks
```

|   |     |    |            |                     |        |                 |      |     |     |     |       |       |
|---|-----|----|------------|---------------------|--------|-----------------|------|-----|-----|-----|-------|-------|
| 0 | / . | 1V | 0/_1/_1C   | 0:_1J <sub>a</sub>  | 0/_0J! | 0:_31Wo <_0:_0> | v1:1 | 0Ga | 0G! | 0G? | 0/4Pp | 0/4Rq |
| 0 | / . | 1V | 0/_2/_2C   | 0:_2J <sub>a</sub>  | 0/_0J! | 0:_31Wo <_0:_0> | v1:1 | 0Ga | 0G! | 0G? | 0/4Pp | 0/4Rq |
| 0 | / . | 1V | 0/_3/_3C   | 0:_3J <sub>a</sub>  | 0/_0J! | 0:_31Wo <_0:_0> | v1:1 | 0Ga | 0G! | 0G? | 0/4Pp | 0/4Rq |
| 0 | / . | 1V | 0/_4/_4C   | 0:_4J <sub>a</sub>  | 0/_0J! | 0:_31Wo <_0:_0> | v1:1 | 0Ga | 0G! | 0G? | 0/4Pp | 0/4Rq |
| 0 | / . | 1V | 0/_5/_5C   | 0:_5J <sub>a</sub>  | 0/_0J! | 0:_31Wo <_0:_0> | v1:1 | 0Ga | 0G! | 0G? | 0/4Pp | 0/4Rq |
| 0 | / . | 1V | 0/_6/_6C   | 0:_6J <sub>a</sub>  | 0/_0J! | 0:_31Wo <_0:_0> | v1:1 | 0Ga | 0G! | 0G? | 0/4Pp | 0/4Rq |
| 0 | / . | 1V | 0/_7/_7C   | 0:_7J <sub>a</sub>  | 0/_0J! | 0:_31Wo <_0:_0> | v1:1 | 0Ga | 0G! | 0G? | 0/4Pp | 0/4Rq |
| 0 | / . | 1V | 0/_8/_8C   | 0:_8J <sub>a</sub>  | 0/_0J! | 0:_31Wo <_0:_0> | v1:1 | 0Ga | 0G! | 0G? | 0/4Pp | 0/4Rq |
| 0 | / . | 1V | 0/_9/_9C   | 0:_9J <sub>a</sub>  | 0/_0J! | 0:_31Wo <_0:_0> | v1:1 | 0Ga | 0G! | 0G? | 0/4Pp | 0/4Rq |
| 0 | / . | 1V | 0/_10/_10C | 0:_10J <sub>a</sub> | 0/_0J! | 0:_31Wo <_0:_0> | v1:1 | 0Ga | 0G! | 0G? | 0/4Pp | 0/4Rq |
| 0 | / . | 1V | 0/_11/_11C | 0:_11J <sub>a</sub> | 0/_0J! | 0:_31Wo <_0:_0> | v1:1 | 0Ga | 0G! | 0G? | 0/4Pp | 0/4Rq |
| 0 | / . | 1V | 0/_12/_12C | 0:_12J <sub>a</sub> | 0/_0J! | 0:_31Wo <_0:_0> | v1:1 | 0Ga | 0G! | 0G? | 0/4Pp | 0/4Rq |
| 0 | / . | 1V | 0/_13/_13C | 0:_13J <sub>a</sub> | 0/_0J! | 0:_31Wo <_0:_0> | v1:1 | 0Ga | 0G! | 0G? | 0/4Pp | 0/4Rq |
| 0 | / . | 1V | 0/_14/_14C | 0:_14J <sub>a</sub> | 0/_0J! | 0:_31Wo <_0:_0> | v1:1 | 0Ga | 0G! | 0G? | 0/4Pp | 0/4Rq |
| 0 | / . | 1V | 0/_15/_15C | 0:_15J <sub>a</sub> | 0/_0J! | 0:_31Wo <_0:_0> | v1:1 | 0Ga | 0G! | 0G? | 0/4Pp | 0/4Rq |
| 0 | / . | 1V | 0/_16/_16C | 0:_16J <sub>a</sub> | 0/_0J! | 0:_31Wo <_0:_0> | v1:1 | 0Ga | 0G! | 0G? | 0/4Pp | 0/4Rq |
| 0 | / . | 1V | 0/_17/_17C | 0:_17J <sub>a</sub> | 0/_0J! | 0:_31Wo <_0:_0> | v1:1 | 0Ga | 0G! | 0G? | 0/4Pp | 0/4Rq |
| 0 | / . | 1V | 0/_18/_18C | 0:_18J <sub>a</sub> | 0/_0J! | 0:_31Wo <_0:_0> | v1:1 | 0Ga | 0G! | 0G? | 0/4Pp | 0/4Rq |
| 0 | / . | 1V | 0/_19/_19C | 0:_19J <sub>a</sub> | 0/_0J! | 0:_31Wo <_0:_0> | v1:1 | 0Ga | 0G! | 0G? | 0/4Pp | 0/4Rq |
| 0 | / . | 1V | 0/_20/_20C | 0:_20J <sub>a</sub> | 0/_0J! | 0:_31Wo <_0:_0> | v1:1 | 0Ga | 0G! | 0G? | 0/4Pp | 0/4Rq |
| 0 | / . | 1V | 0/_21/_21C | 0:_21J <sub>a</sub> | 0/_0J! | 0:_31Wo <_0:_0> | v1:1 | 0Ga | 0G! | 0G? | 0/4Pp | 0/4Rq |
| 0 | / . | 1V | 0/_22/_22C | 0:_22J <sub>a</sub> | 0/_0J! | 0:_31Wo <_0:_0> | v1:1 | 0Ga | 0G! | 0G? | 0/4Pp | 0/4Rq |



# Story Time

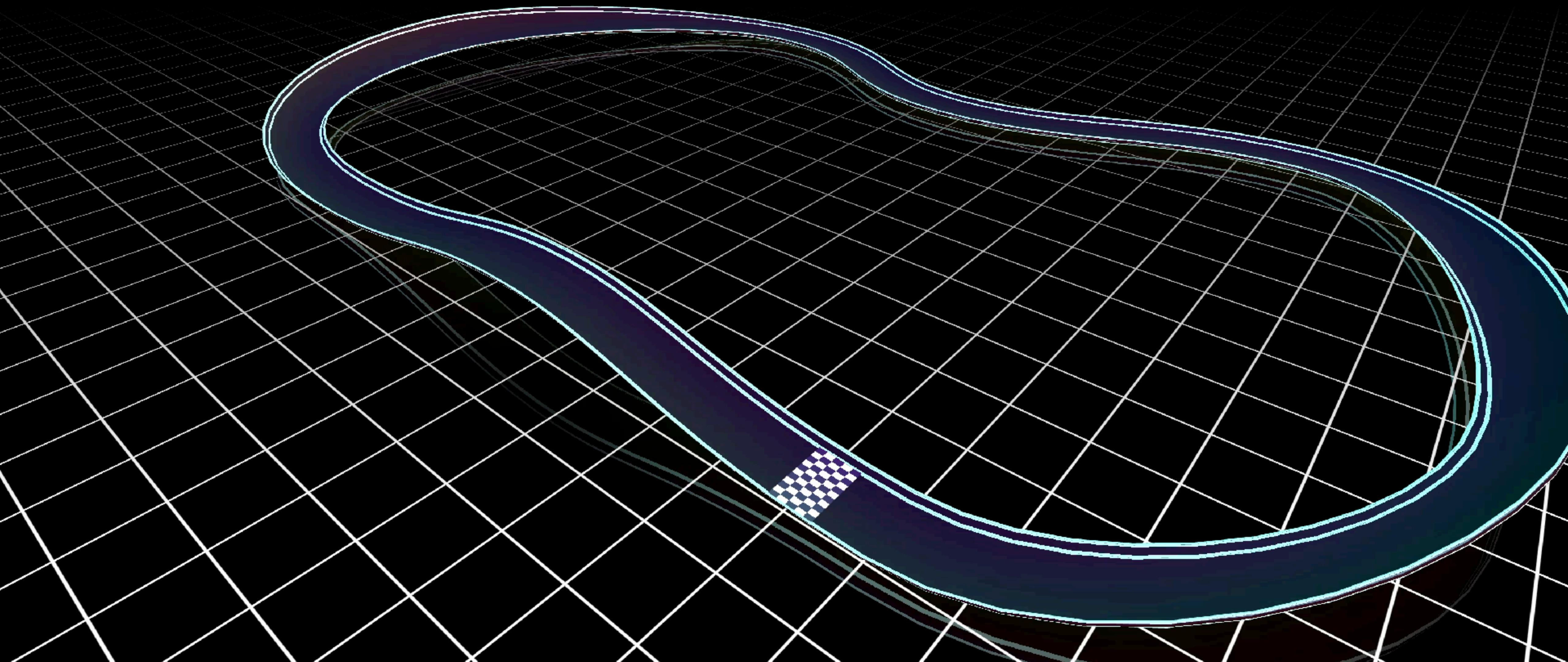




Verify it's you



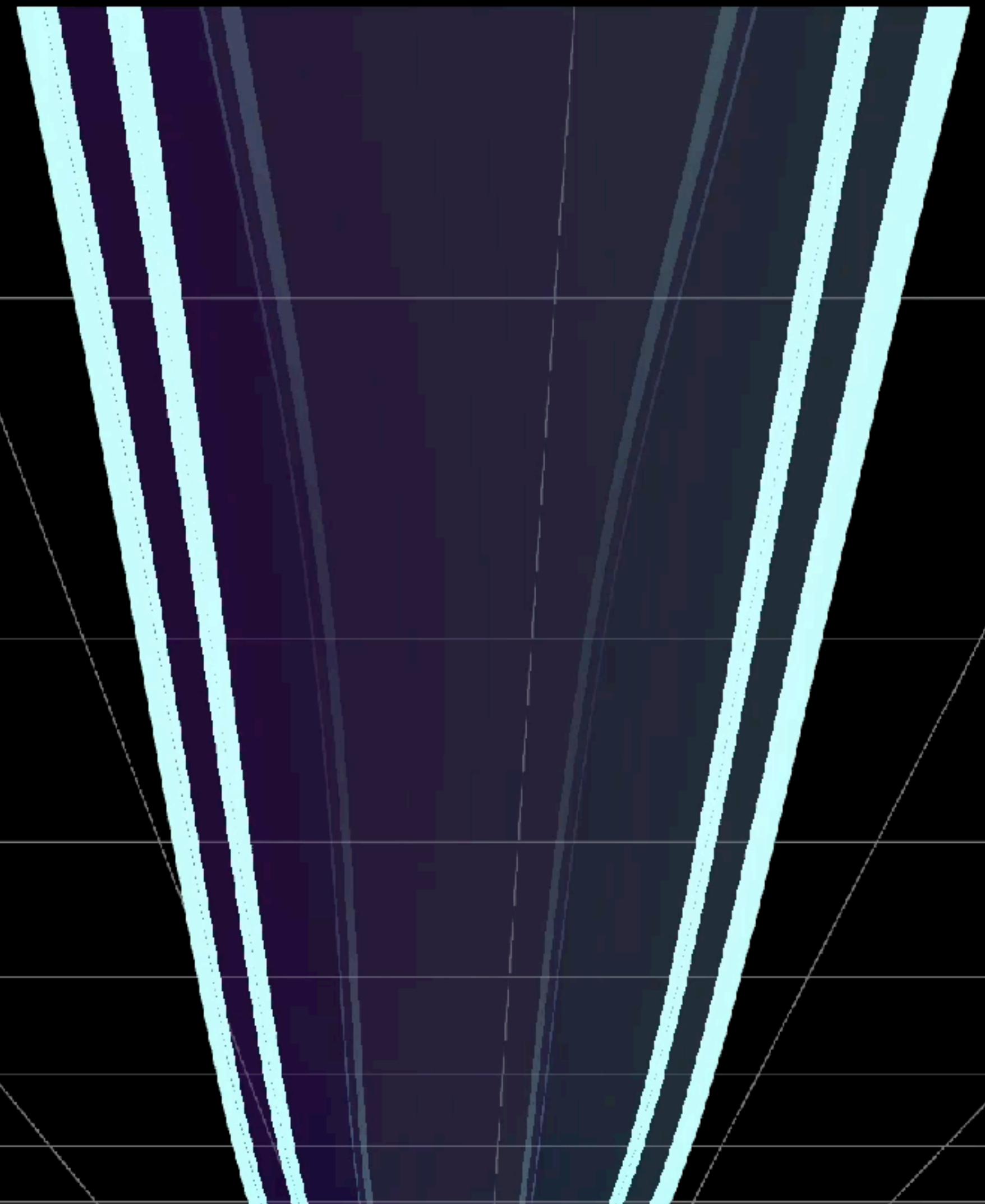
# REPLAY



BACK

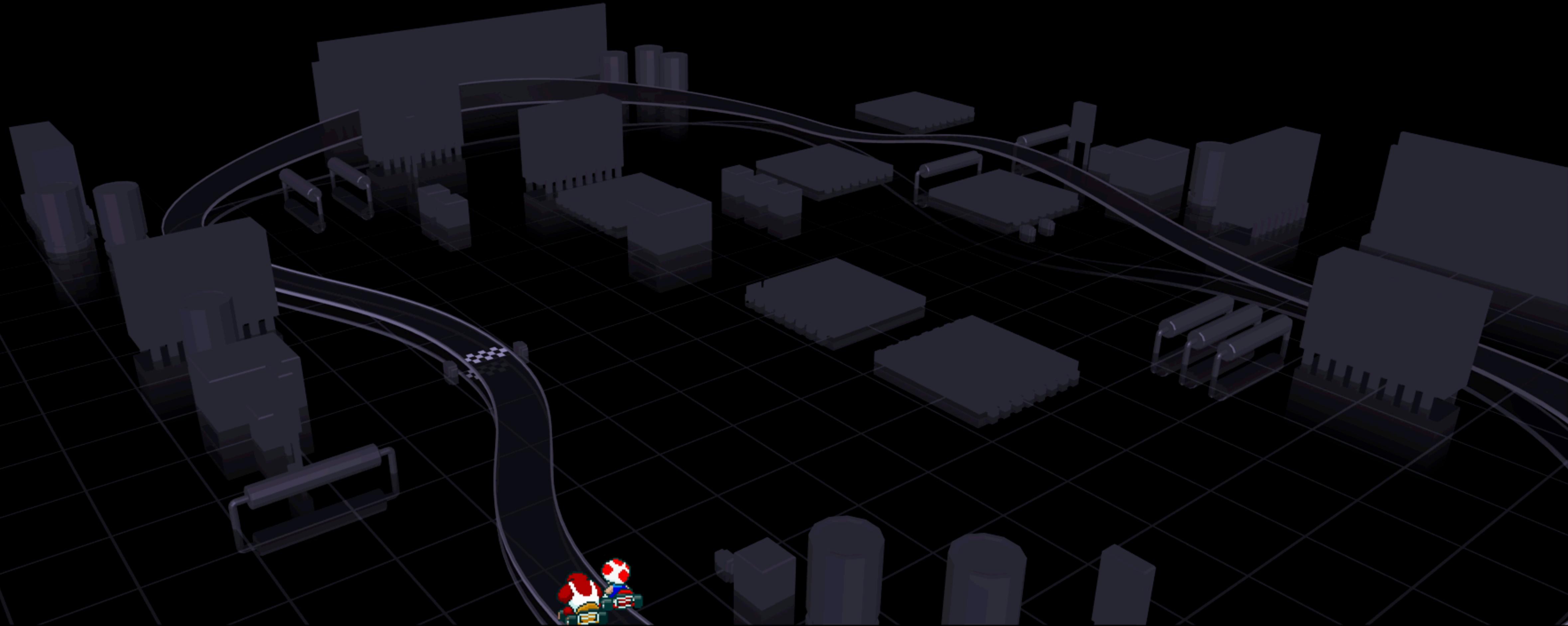
CONTINUE

# *REPLAY*



BACK

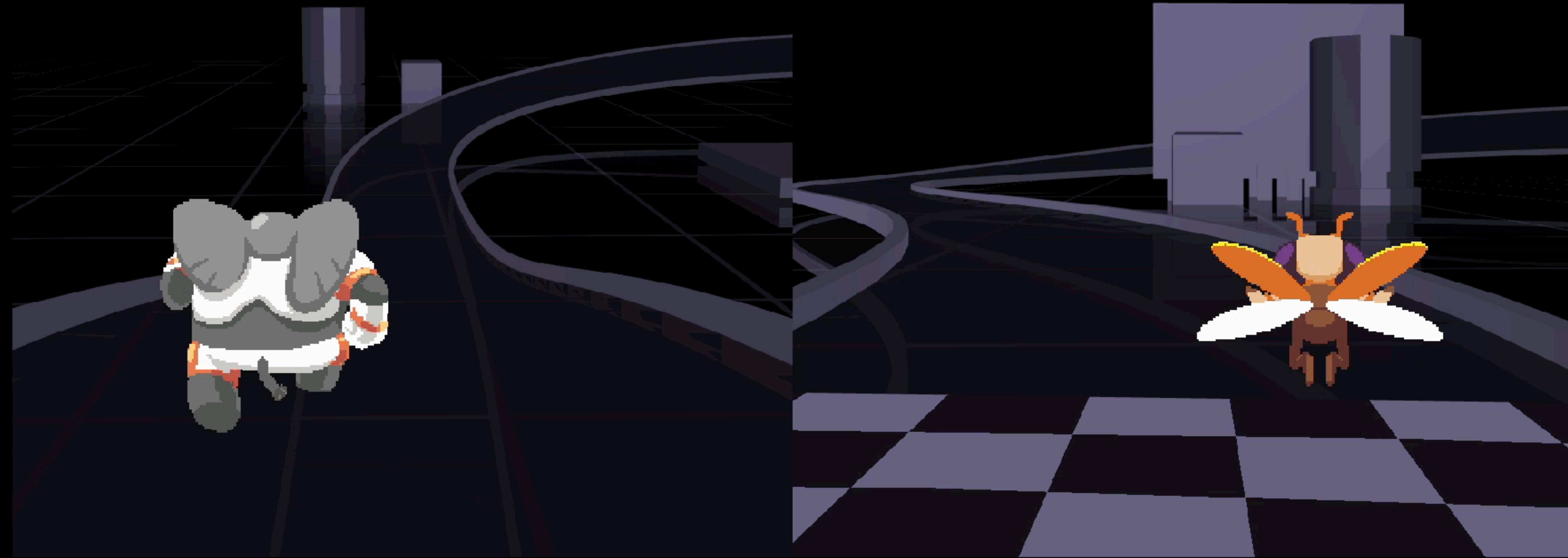
CONTINUE



BACK

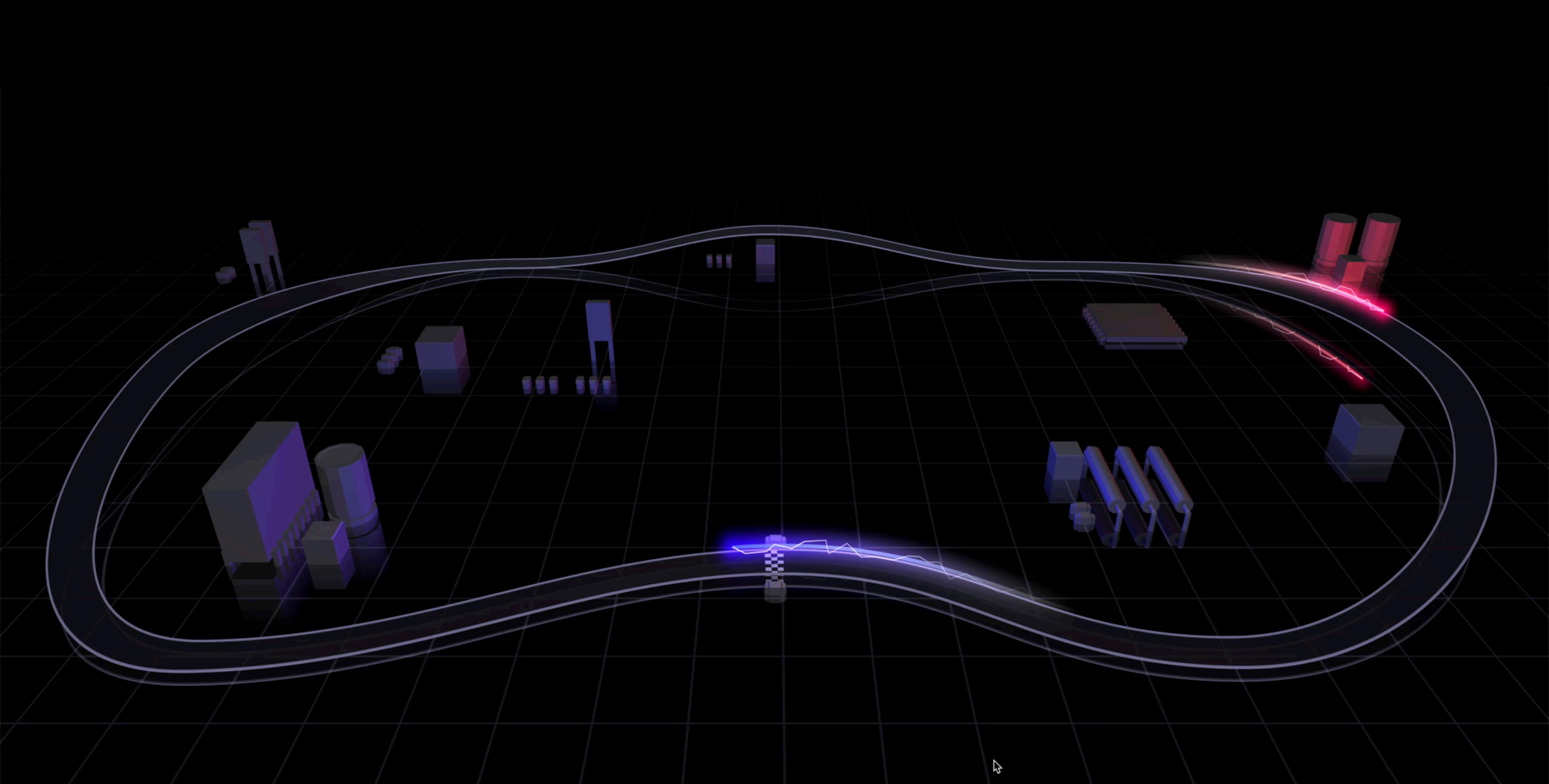
CONTINUE

# REPLAY

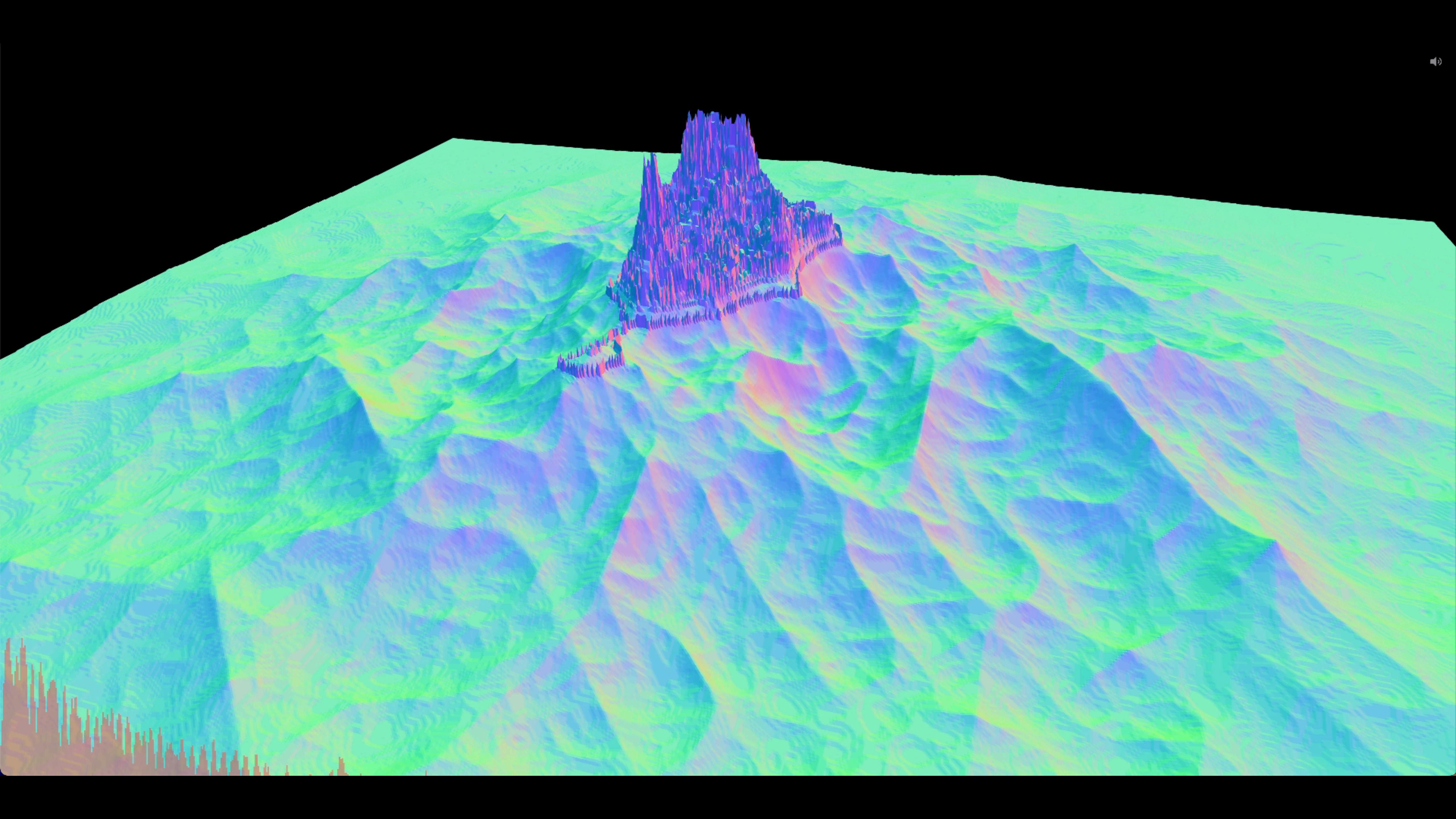


BACK

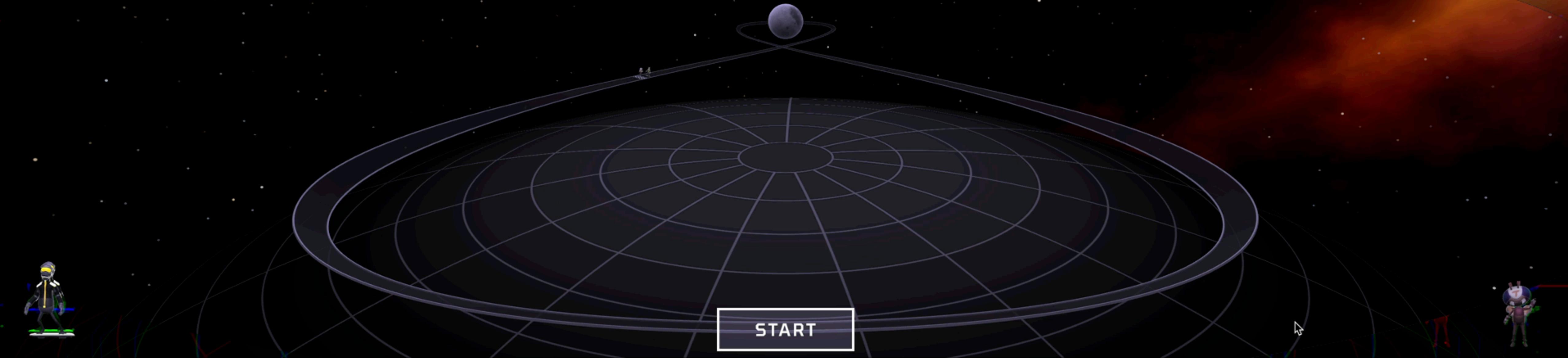
CONTINUE







DuckDB LAP 1/10 0.0 TPS 0 T+00:00  
TigerBeetle LAP 1/10 0.0 TPS 0 T+00:00

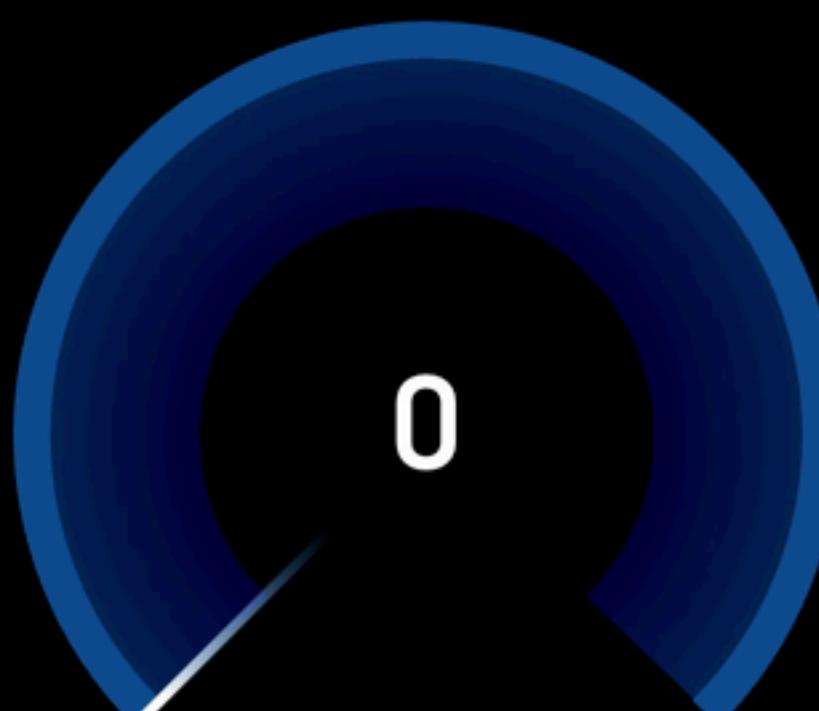
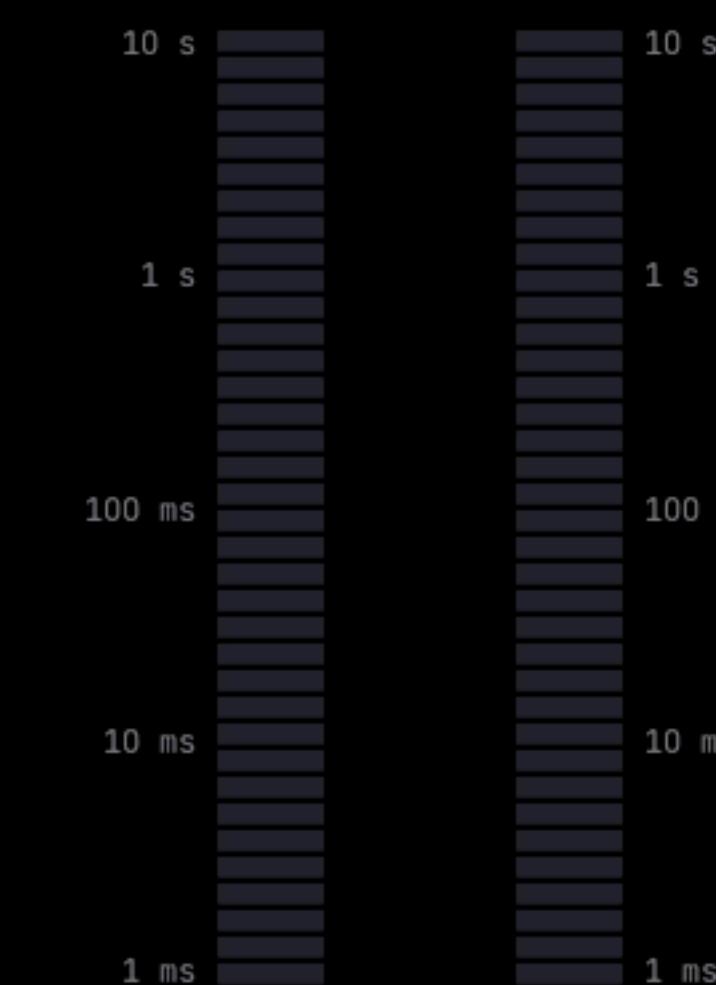
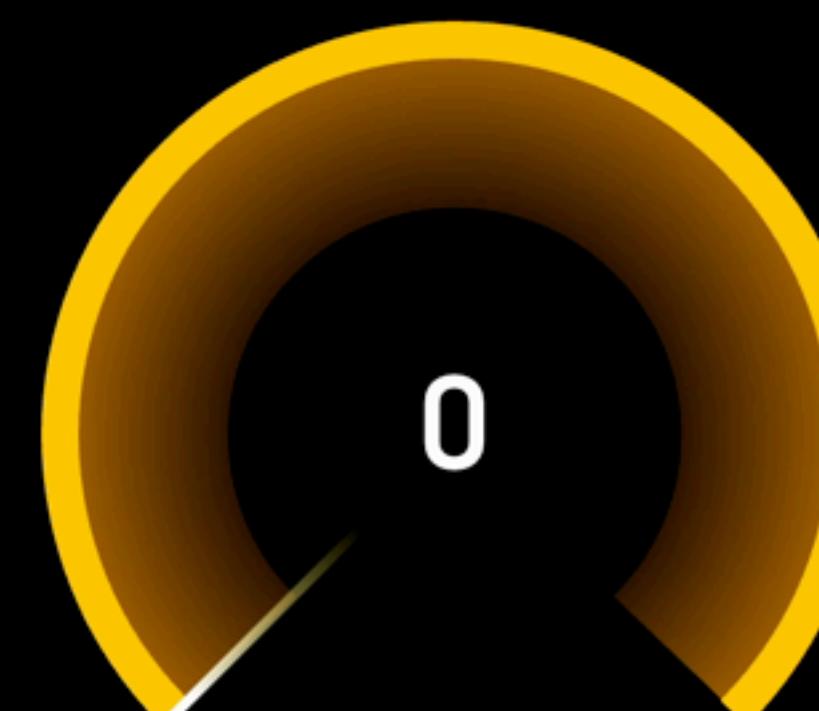


## DuckDB

What's cooler than stored procedures?

Machine  
CPU  
Memory  
Network  
Storage

i8g.16xlarge  
64 vCPUs  
512 GiB  
37.5 Gigabit  
NVMe



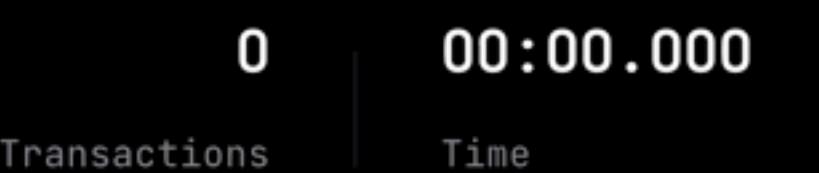
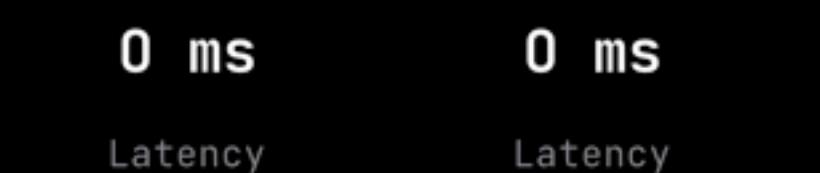
## TigerBeetle

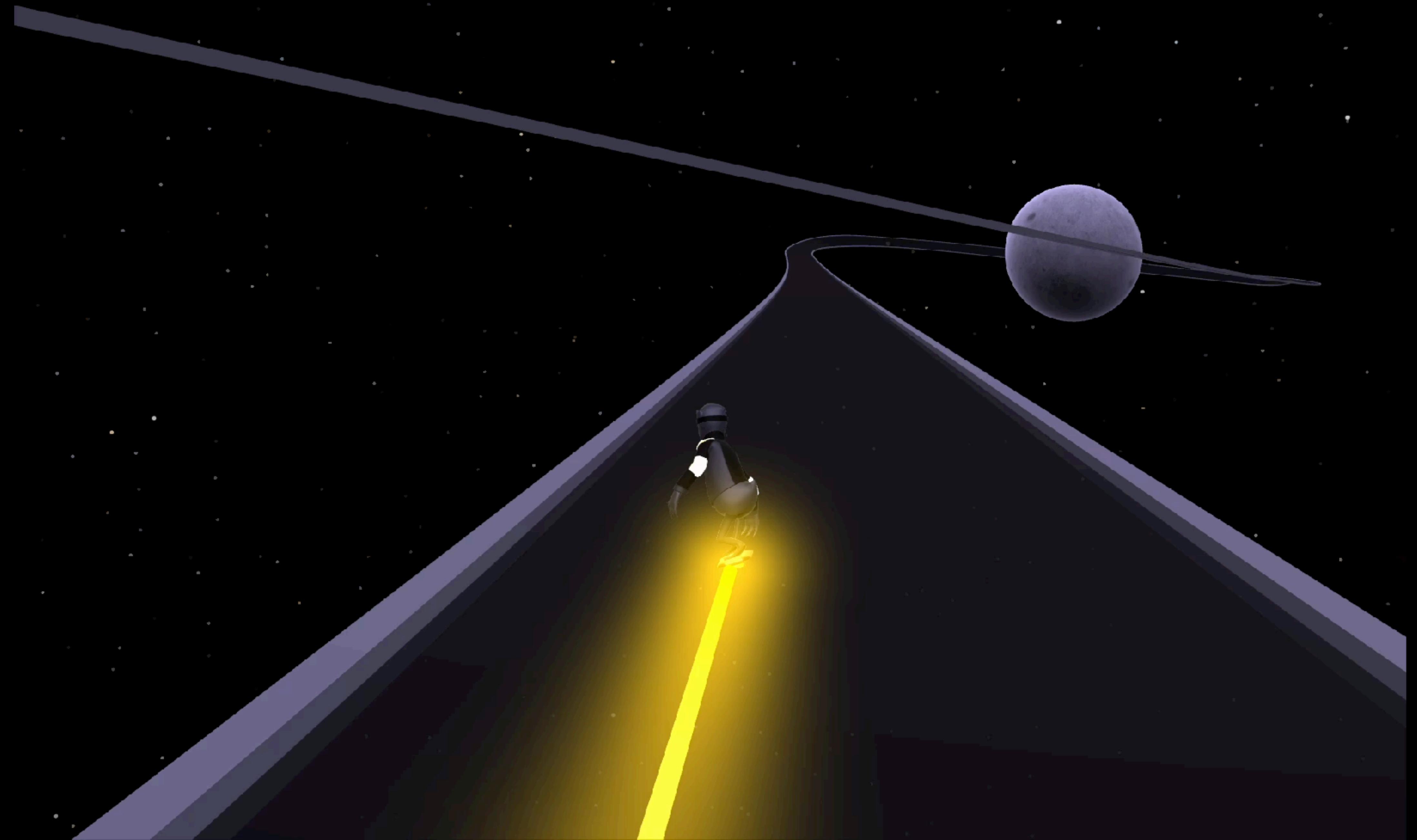
Why big iron when you can beetle?

Machine  
CPU  
Memory  
Network  
Storage

4x i8g.16xlarge  
64 vCPUs  
512 GiB  
37.5 Gigabit  
NVMe

\$ ./start\_duckdb.sh





How?

# Choose your Engine

- Unreal Engine? - Only native
- Unity/Godot? - Empty web project sits at 100 MB
- Three.js - scene graph interface, not a lot of control
- Compile Zig to WASM and use WebGL for graphics

The image shows a dual-pane development interface. On the left is a 2D game engine preview window displaying a level with a green tiled floor, orange platforms, and a blue background. A small green character is standing on a platform. On the right is a code editor with tabs for build.zig, main.zig, Player.zig (the active tab), and index.html. The code in Player.zig is a movement system:

```
src > Player.zig > doMovement
197 fn doMovement(player: *Player, room: Room, attrs: []const Tile.Attrib, input: Input, prev_
198 ... player.vx = 0;
199 ... var on_ground = room.clipY(attrs, player.box, 1) == 0; // moving 1 pixel down
200 ... if (!on_ground) {
201 ...     // apply gravity
202 ...     player.vy += 0x40;
203 ...     if (player.vy > vmax) player.vy = vmax;
204 ... } else {
205 ...     player.vy = 0;
206 ... }
207 ...
208 ... if (input.left) player.vx -= 0x200; // -0x014C; You, 14 months ago • Simplify movement
209 ... if (input.right) player.vx += 0x200; // 0x014C;
210 ... if (input.jump and !prev_input.jump and on_ground) {
211 ...     player.vy = jump_speed;
212 ... }
213 ... if (!input.jump and player.vy < -0x021f) {
214 ...     // jump key released
215 ...     player.vy = 0;
216 ... }
217 ... if (input.down and on_ground) {
218 ...     const sense_x = player.box.x + @divTrunc(player.box.w, 2);
219 ...     const sense_y = player.box.y + player.box.h;
220 ...     if (room.getTileAttribAtPixel(attrs, sense_x, sense_y) == .ladder) { // do climbing
221 ...         player.box.x = @divTrunc(sense_x, Tile.size) * Tile.size;
222 ...         player.box.y = sense_y - 8;
223 ...         player.vx = 0;
224 ...         player.vy = 0;
225 ...         player.state = .climbing;
226 ...         return;
227 ...     } else if (input.jump and !prev_input.jump) {
228 ...         player.state = .sliding;
229 ...         if (player.box.h == height) {
230 ...             player.box.y += 8;
231 ...             player.box.h -= 8;
232 ...         }
233 ...         player.slide_frames = 24;
234 ...         player.vy = 0;
235 ...         return;
236 ...     }
237 ... }
238 ... if (input.up) {
```

# Live Editing

- Store runtime application data in a single nested struct
- Serialize (JSON) data in beforeunload event to localStorage
- Deserialize data in onload from localStorage

# Resources

- `@embedFile` is your friend
- Everything is statically allocated (TigerStyle)
- Convert assets in `build.zig`, no runtime processing

# Immediate Mode GUI

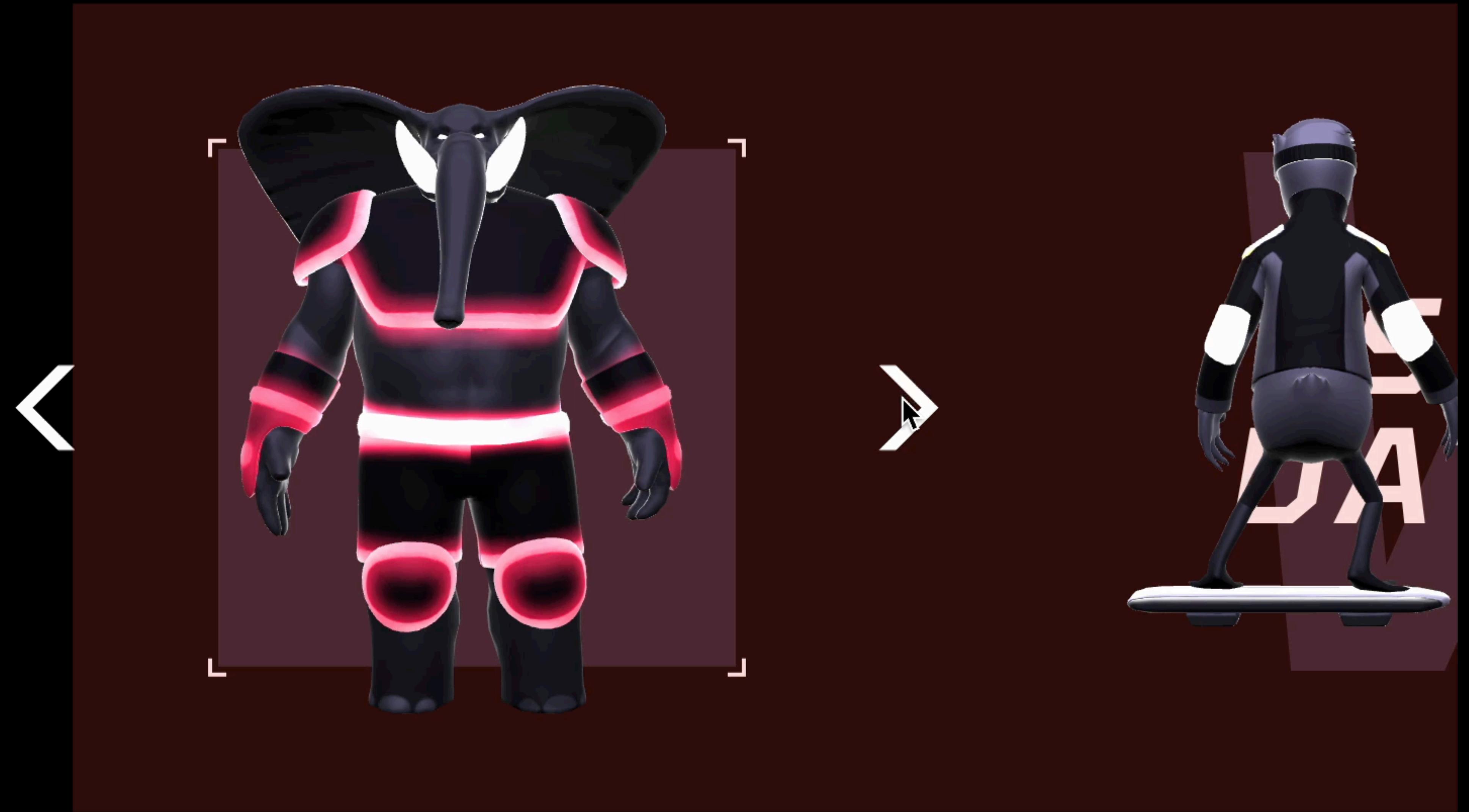
```
if (gui.button("ABOUT", rect_about, .{ .style = .text_only }))  
{  
    web.open_link(url_about);  
}
```

# Animation

- Transition properties between 2 states
- Use easing functions
- Helpers for keyframing properties



# Animation 2



# Shaders

PostgresSQL

As tried and tested as Windows 95!

|         |                     |
|---------|---------------------|
| Machine | <b>i8g.16xlarge</b> |
| CPU     | <b>64 vCPUs</b>     |
| Memory  | <b>512 GiB</b>      |
| Network | <b>37.5 Gigabit</b> |
| Storage | <b>NVMe</b>         |

\$ ./start\_postgres.sh

# Fullscreen Shaders

PLAYER ONE

< >



TigerBeetle

Why big iron when you can beetle?



BACK

RACE

# General Purpose Benchmarking

# Questions?