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Flow - A framework for *browser-based interactive* audio applications

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The Web Audio API brings real time audio synthesis and processing to the browser with a high-level JavaScript API. A number of frameworks have since been developed to make Web Audio application development easier such as BRAID [1], WAAX [2], and Flocking [3].

When reviewing these libraries we have identified **two problems** in how these frameworks suggest programs should be structured:

1) Audio and UI Coupling: Audio nodes are manipulated directly in UI event callbacks. This coupling makes it *diffficult to change* one without impacting the other.

2) Fragmented State: Audio and UI elements are *stateful objects*. This causes application state to become scattered around the codebase, making it *difficult to track changes* and find bugs.

Keywords: Web Audio API / declarative programming / Model-View-Update

Flow takes a different approach by mandating that all audio and UI elements must be created from a single model of application state, and neither can manipulate that state directly.

Scan the QR code with your mobile's camera to access the full paper.

Additionally Flow's documentation can be found by heading to: **b.link/flow-docs**

[1] Ben Taylor and Jesse Allison. 2015. BRAID: A web audio instrument builder with embedded code blocks. In Proceedings of the 1st interna- tional Web Audio Conference.
[2] Hongchan Choi and Jonathan Berger. 2013. WAAX: Web Audio API eXtension.. In NIME. 499–502.
[3] Colin BD Clark and Adam Tindale. 2014. Flocking: a framework for declarative music-making on the Web. In SMC Conference and Summer School. 1550–1557.

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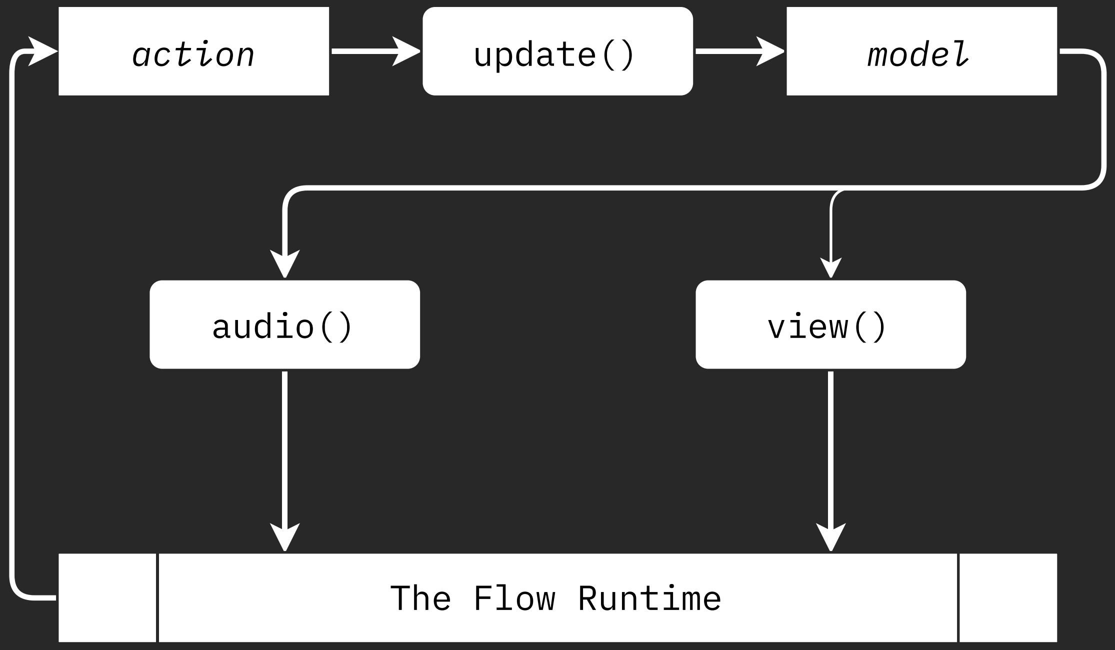
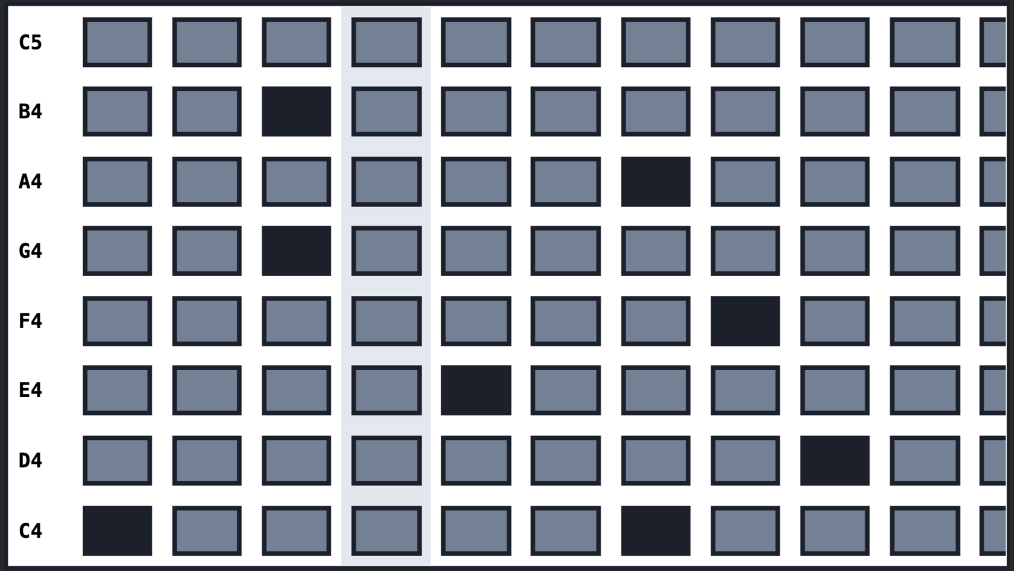


Flow enforces the **Model-View-Update** architecture to allow for clear, deterministic updates to application state. **Actions** are dispatched by the runtime in response to some event. A single **update** function then determines how to create a new application **model**. This single model is then used by the **audio** and **view** functions to generate the audio graph and HTML output respectively.

```
function audio (model) {
  return model.steps.map(({ note, active }) ⇒
    N.oscillator([ P.frequency(note) ], [
      N.gain( [ P.gain(active ? 1 : 0) ], [
        N.dac()
      ])
    ])
  )
}
```



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