pedestal

relevance

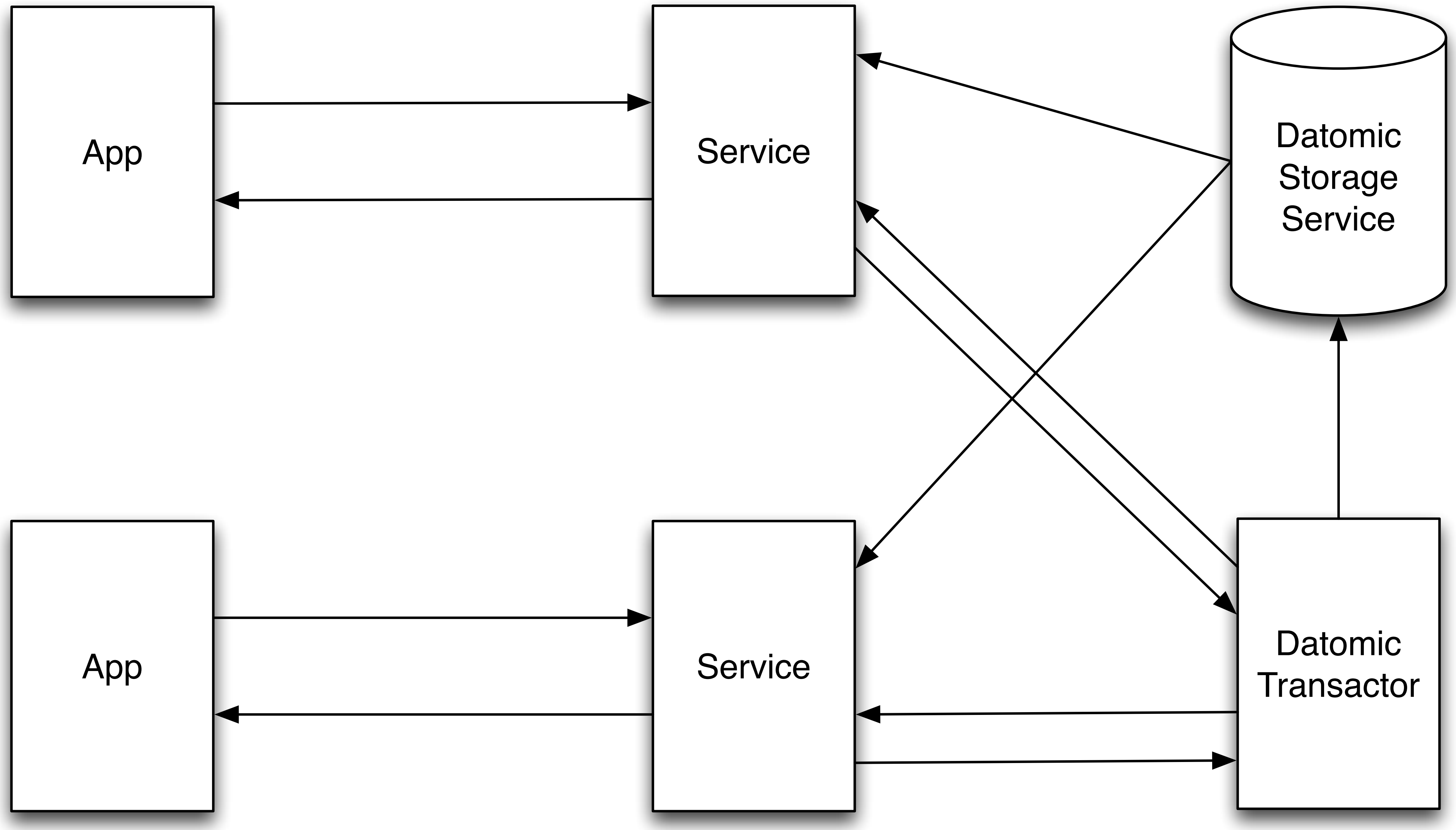
Introducing Pedestal

- Who: Relevance
- What: alpha release, open source libs
- Where: Clojure/West
- When: Now
- Why, How...

Goal

- Use clojure end-to-end to build rich interactive collaborative Web applications and services that scale

Archetype


App
Service
Datomic Storage Service
App
Service
Datomic Transactor

Problems

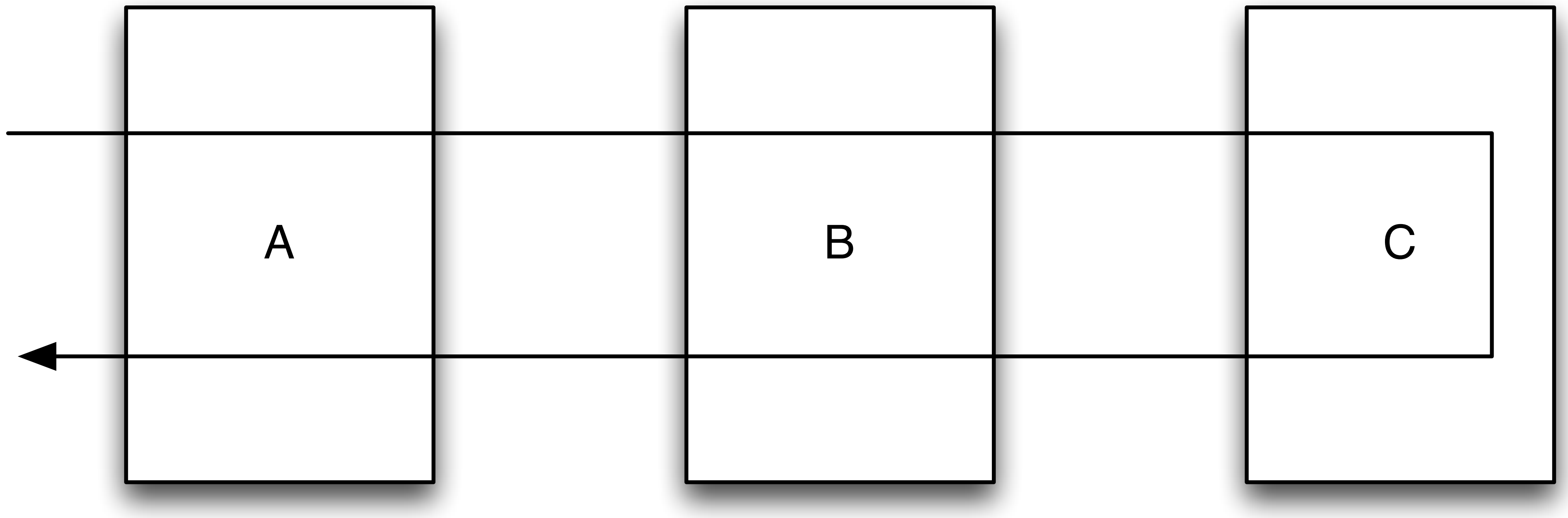
- Services notifying apps
- Building complex UIs in browser

Service Plumbing

- Interceptor mechanism
- Long polling, server-sent events
- Routing, url generation

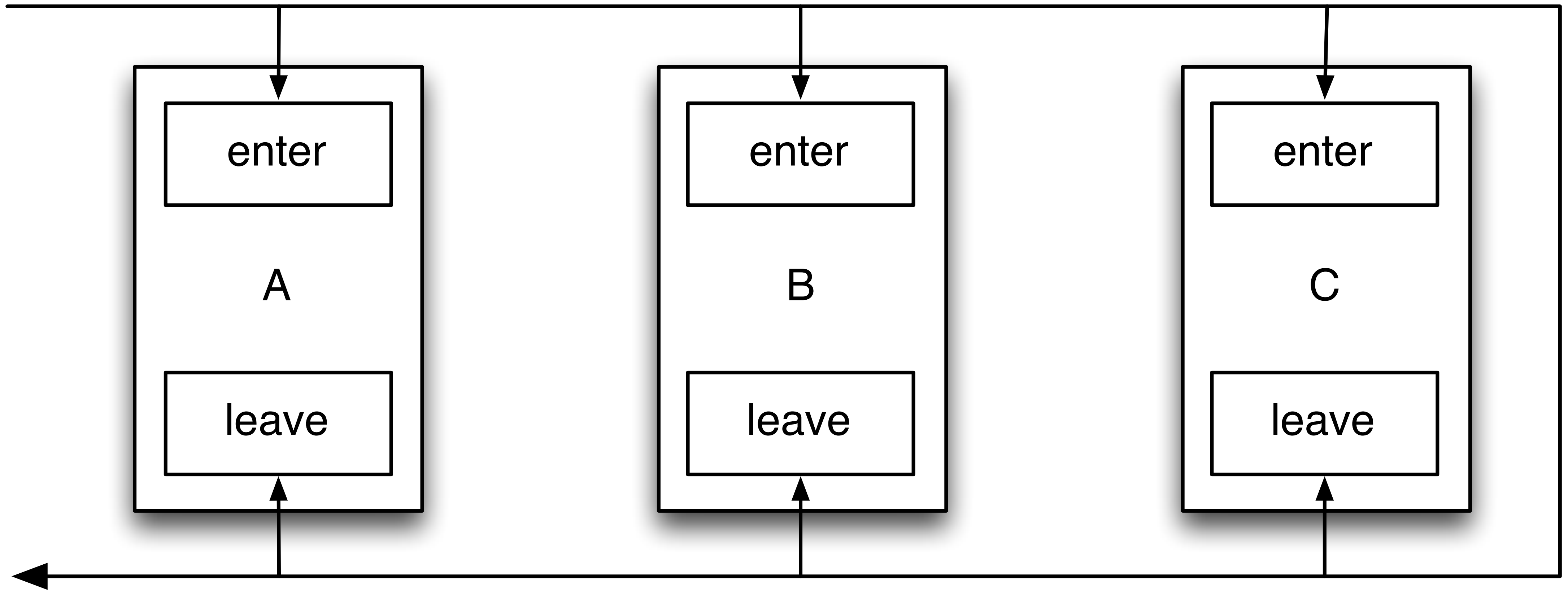
Ring Middlewares

- Chained fns bound to thread's stack



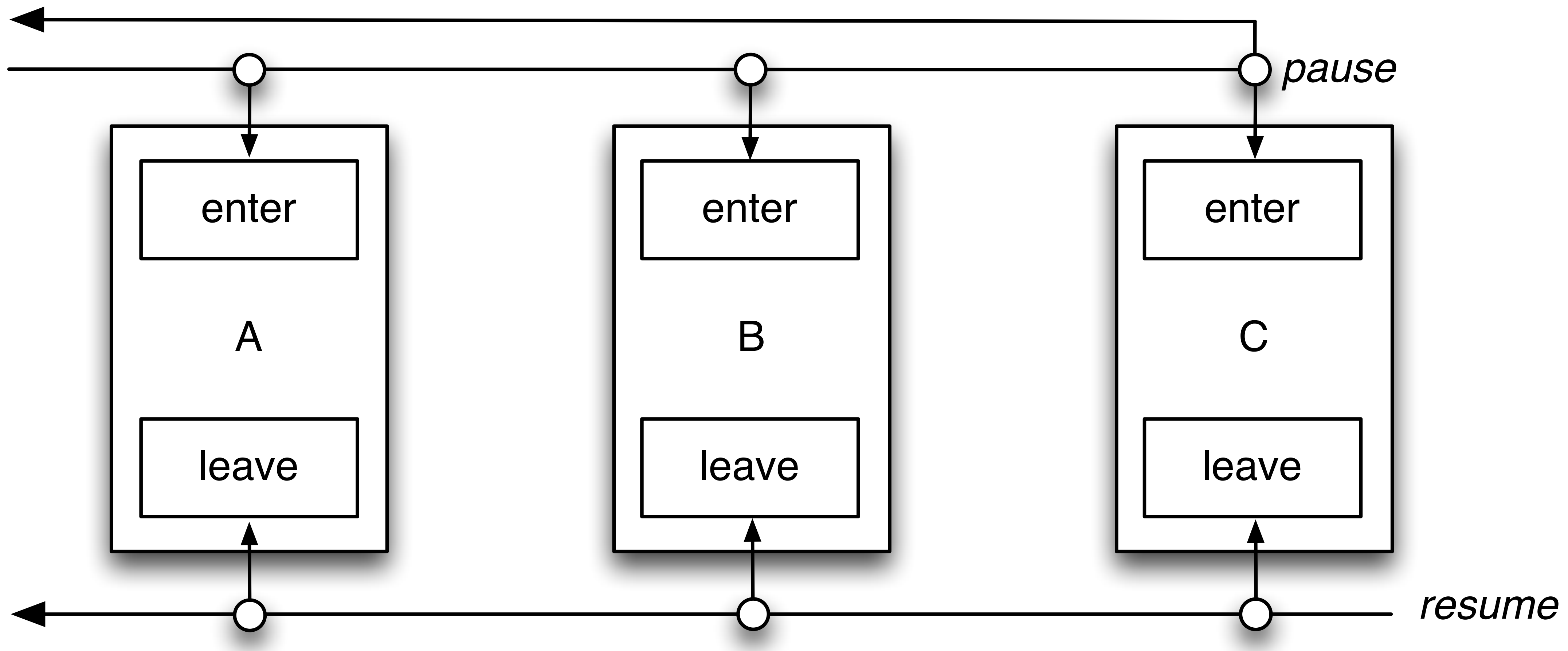
Interceptors

- Maps of fns not bound to thread's stack



Pause/Resume

- Can pause/resume across threads
- Supports bindings and error propagation



Ring Compatibility

- As compatible as possible
- Same request/response maps
- Core middlewares refactored and accepted
    - Interceptor versions provided
- Easy to port existing code

Notifications

- Thread management enables long polling
  - Park request as needed
- Also, server-sent-events
  - Built on low-level streaming API

Routes and URLs

ring handler fn

native edn serialization

```
(defn hello-world [req]
  (ring/response (map inc [1 2 3]))

(defroutes routes
  [[["/hello-world" {:get hello-world}]]])

(def url-for (routes/url-for-routes routes))

(url-for ::hello-world)
;;=> "/hello-world"
```

routes as data

make urls
from routes

Problems

- ~~Services notifying apps~~
- Building complex UIs in browser

3 Simple Steps

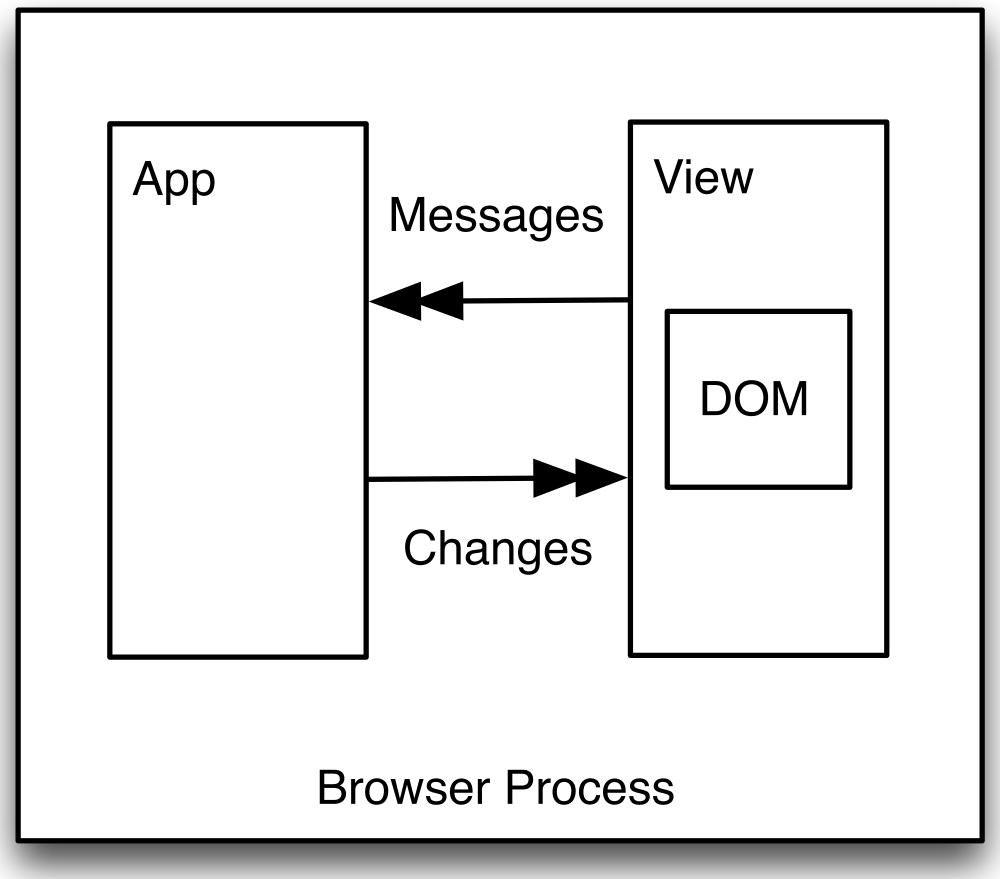
- Event handler affects state
- *Figure out what changed*
- Update DOM

What to compare?

- JS: event, old OR new state, DOM
- CLJS: event, old AND new state, DOM

- Can remove DOM from equation!

App vs. View



- App: behavior
- View: presentation

App Model

- Encapsulate behavior and state
- Input: messages
- Output: app tree deltas
- Implemented as pure functions
- Fns wired up declaratively

Messages

- Map with topic and type
- Other keys as needed
- Used for input to app
- Used to control aspects of engine

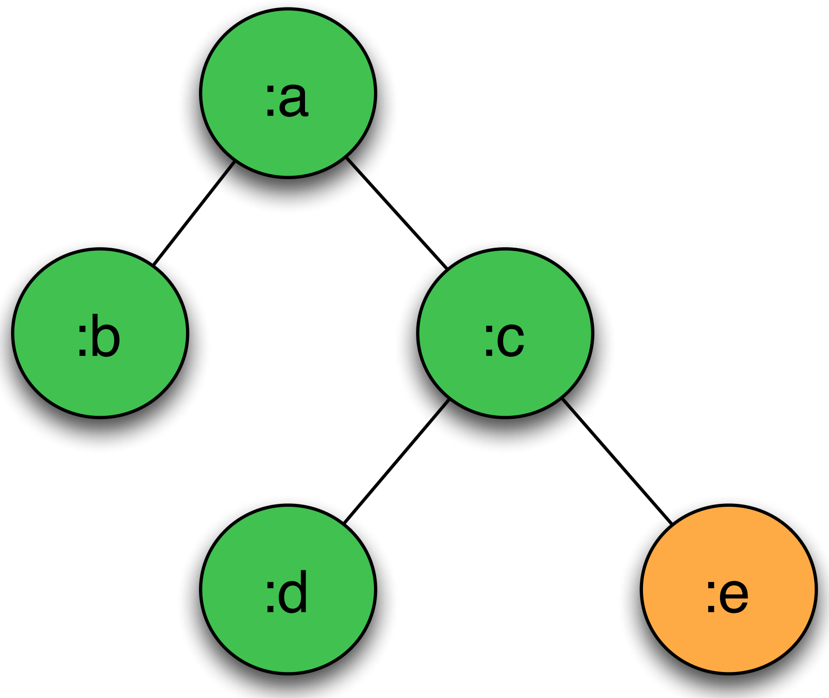
```
{msg/topic :count-transform
 msg/type :inc
 :key :a}
```

App Tree Deltas

```
op           path      args
 ↓             ↓        ↓
[:node-create [:a :b :c] :map]
[:node-destroy [:a :b :c]]
[:value [:a :b :c] {:count 2}]
[:attr  [:a :b :c] :active true]
[:transform-enable [:a :b :c] :send-info
                              [{msg/topic :some-model
                                msg/type :send-name
                                (msg/param :name) {}}]]
[:transform-disable [:a :b :c] :send-info]
```

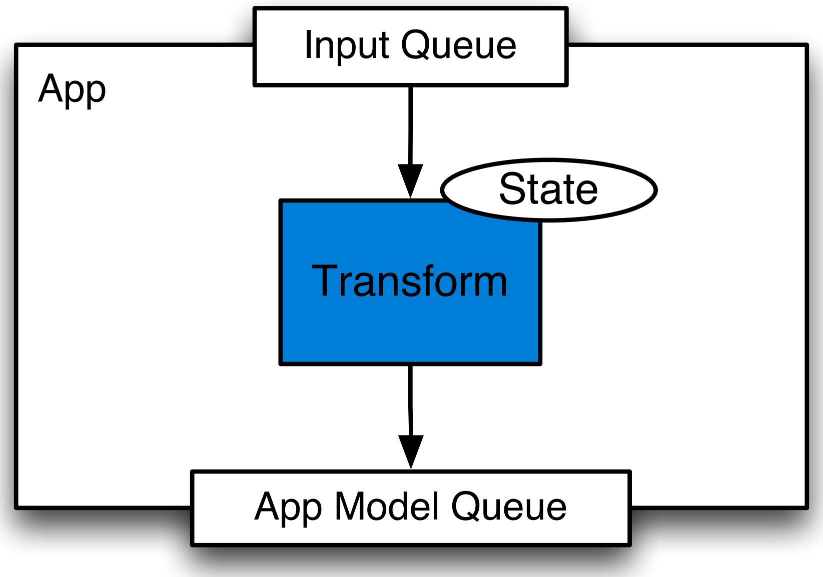
App Tree is Logical

- Consumer *may* or *may not* realize (portions of) tree as real structure



```
{
:value 42
:attributes {:disabled true}
:transforms {:change [{:node :e}]
}
```

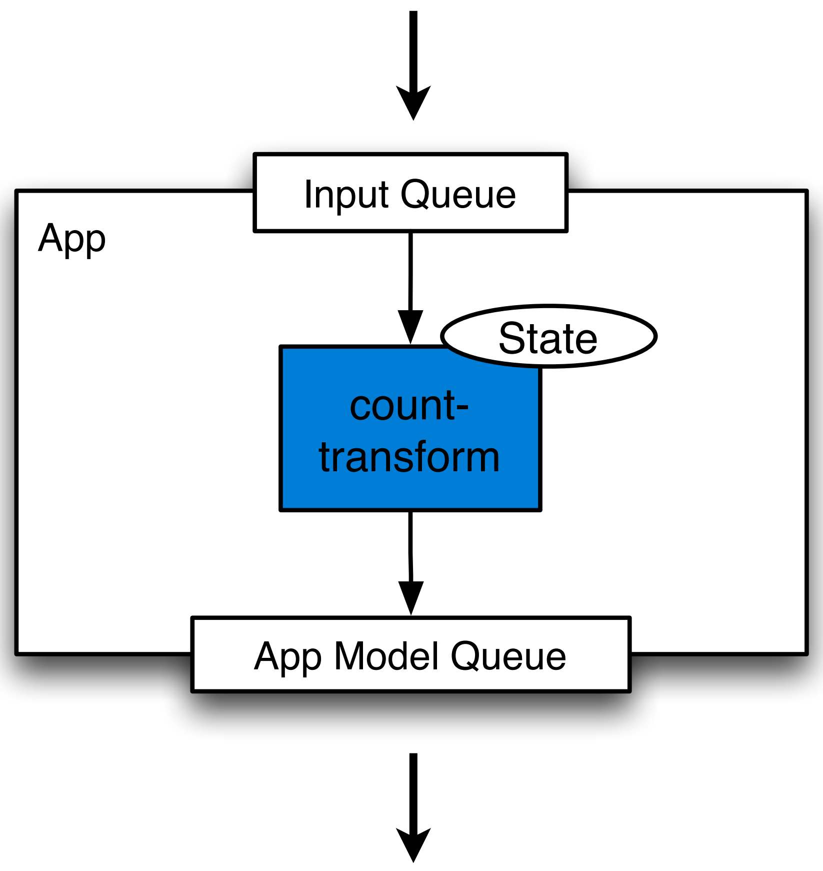
Transform



- Fn that modifies state
- Message, state input
- Last output state kept
- Only changes flow

Transform

```
(put-message (:input-queue app)
  {msg/topic :count-transform msg/type :inc}
```



```
(defn count-transform [t-state message]
  (condp = (msg/type message)
    msg/init (:value message)
    :inc (inc (or t-state 0))
    t-state))
```

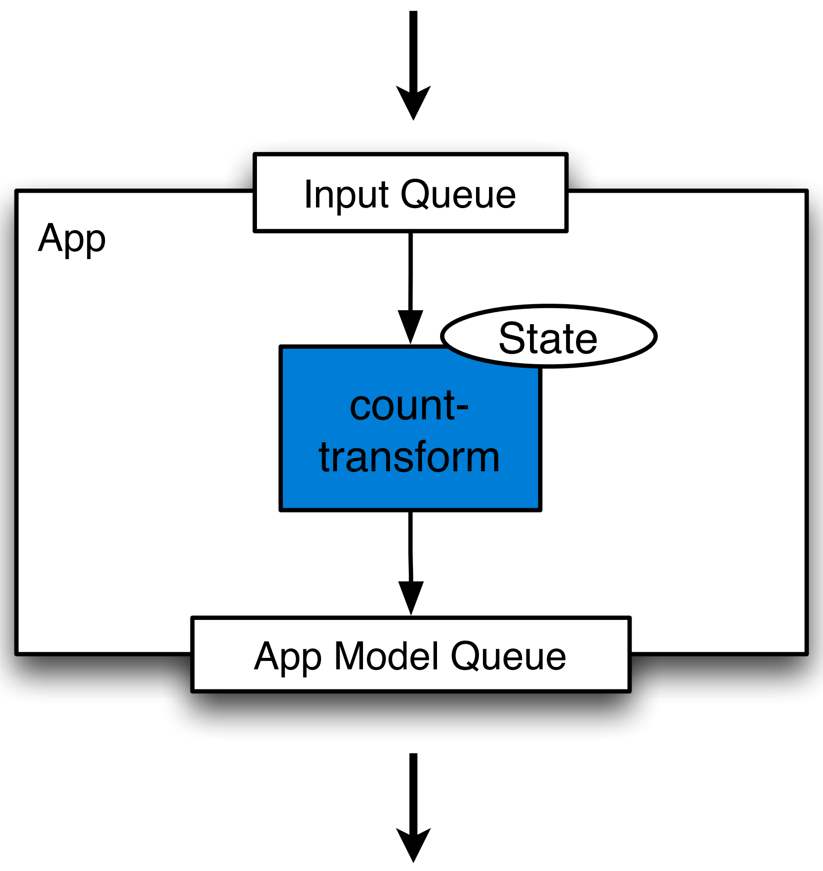
```
([:value [:io.pedestal.app/view-count-transform] 10 11])
```

Transform output

```
;; message input...
{msg/topic :count-transform msg/type :inc}

;; deltas output...
([:value [:io.pedestal.app/view-count-transform] 10 11])


;; message input...
{msg/topic :count-transform msg/type :inc}

;; deltas output...
([:value [:io.pedestal.app/view-count-transform] 11 12])

...
```

More State

```
(put-message (:input-queue app)
  {msg/topic :count-transform msg/type :inc :key :a}
```



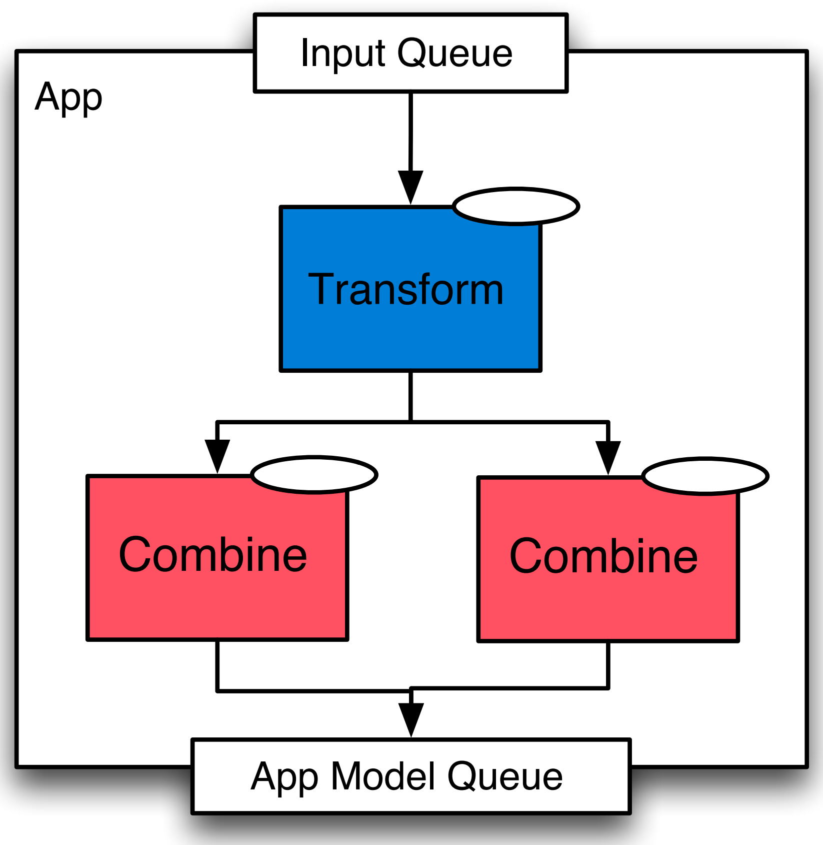
```
(defn count-transform [t-state message]
  (condp = (msg/type message)
    msg/init (:value message)
    :inc (update-in (or t-state {})
                    (:key message)
                    inc)
    t-state))
```

```
([:value [:io.pedestal.app/view-count-transform]
  {:a 10 :b 9} {:a 11 :b 9}])
```

Affecting Parts of State

```
;; put a message in...
{msg/topic :count-transform msg/type :inc :key :a}

;; get deltas out...
 ([:value [:io.pedestal.app/view-count-transform]
    {:a 10 :b 9} {:a 11 :b 9}])


;; put a message in...
{msg/topic :count-transform msg/type :inc :key :b}

;; get deltas out...
 ([:value [:io.pedestal.app/view-count-transform]
   {:a 11 :b 9} {:a 11 :b 10}])

...
```

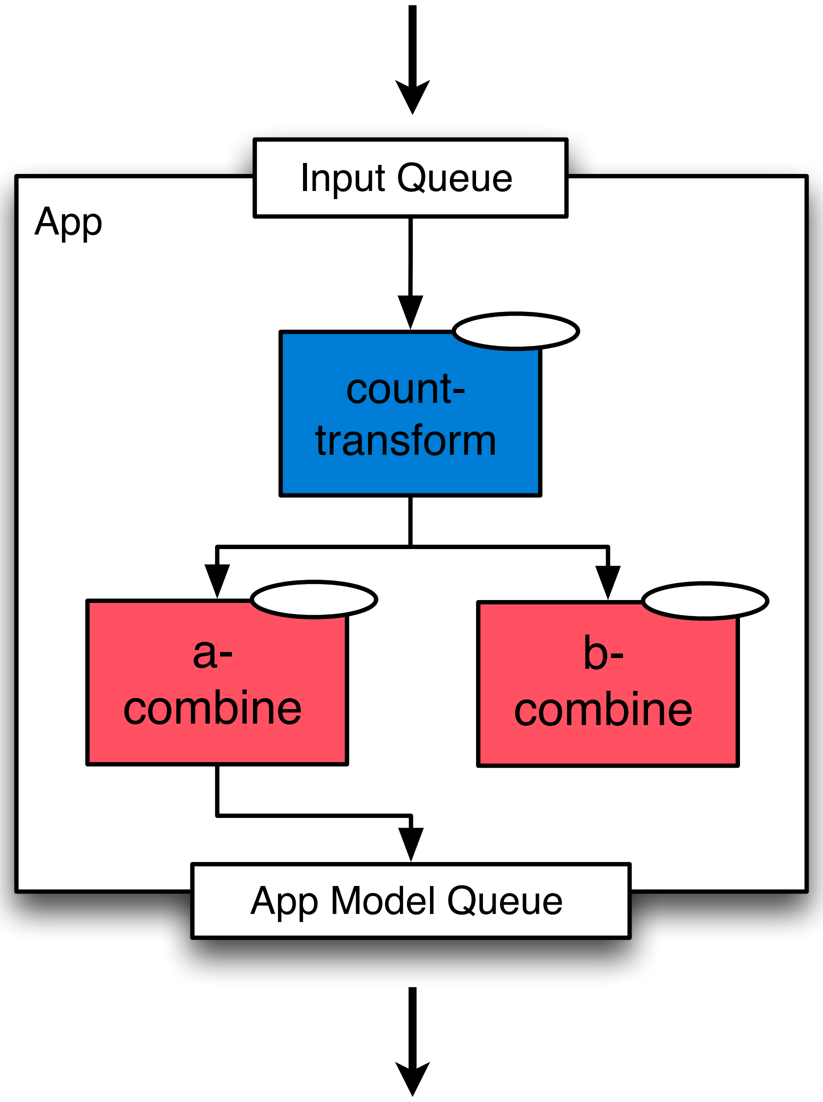
Combine



- Fn that merges or splits state(s)
- Transform and/or combine state(s) input
- Engine keeps last output
- Only changes flow

Combine

```
{msg/topic :count-transform msg/type :inc :key :a}
```

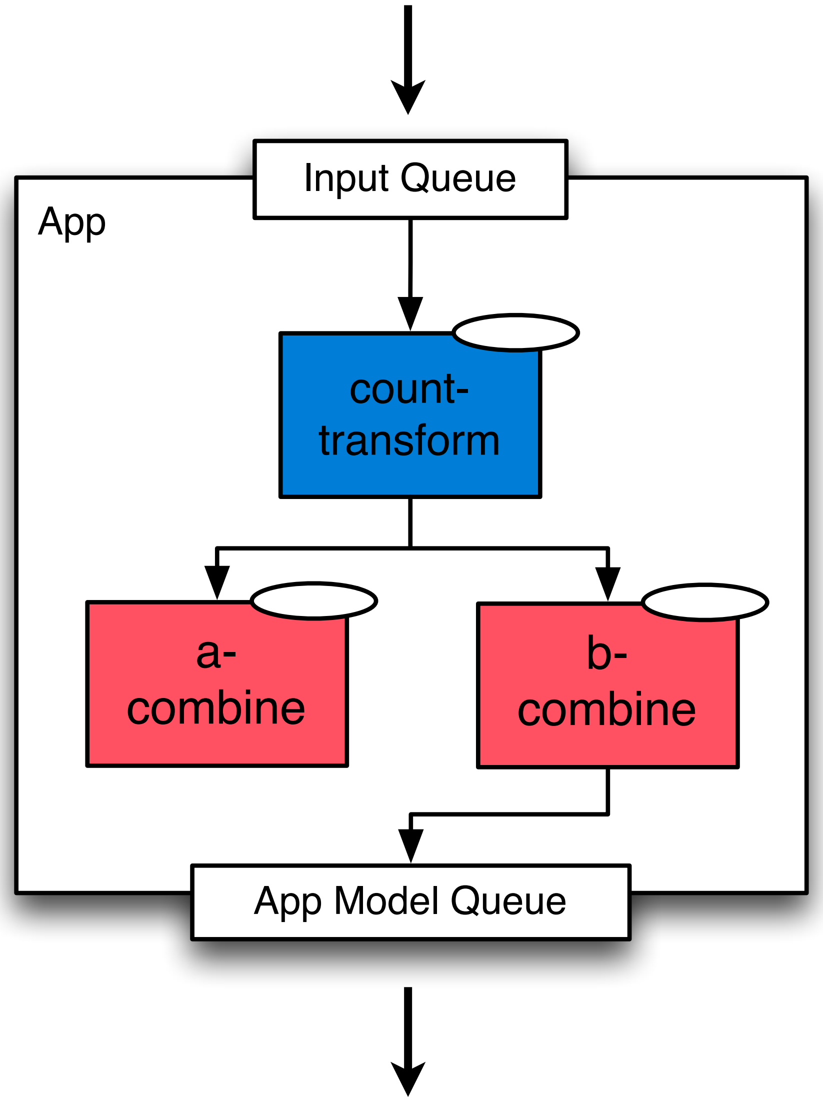


```
(defn a-combine [c-state t-name
                 t-old-val t-new-val]
  (:a t-new-val))

(defn b-combine [c-state t-name
                 t-old-val t-new-val]
  (:b t-new-val))
```

```
([:value [:a-combine] 10 11])
```

Combine

```
{msg/topic :count-transform msg/type :inc :key :b}
```

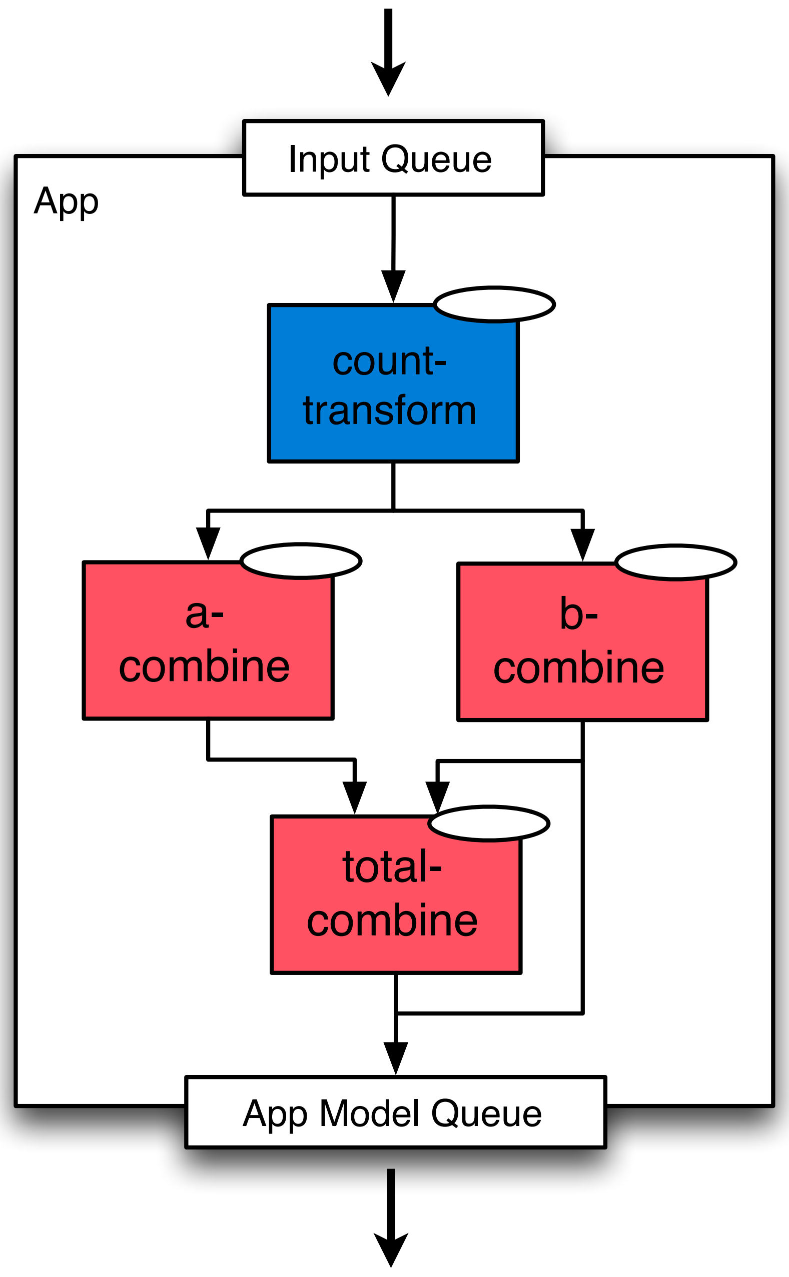


```
(defn a-combine [c-state t-name
                 t-old-val t-new-val]
  (:a t-new-val))

(defn b-combine [c-state t-name
                 t-old-val t-new-val]
  (:b t-new-val))
```

```
([:value [:b-combine] 9 10])
```

Combine

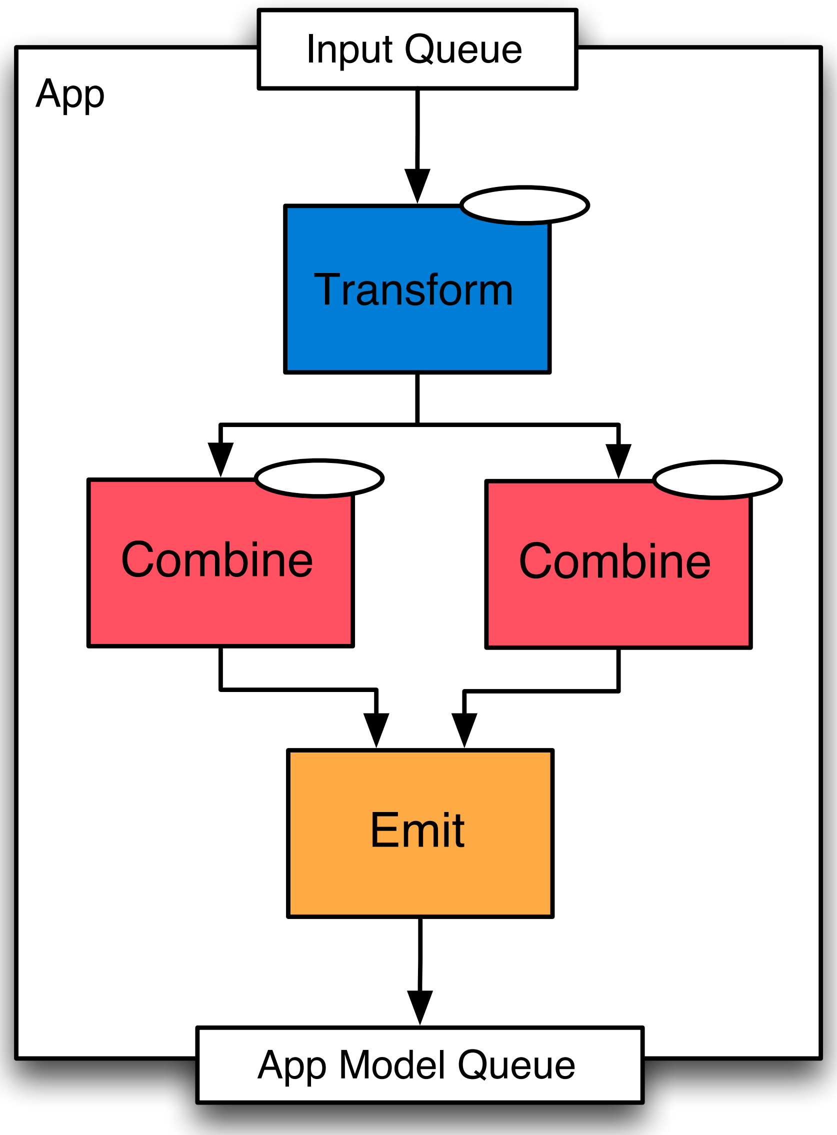
```
{msg/topic :count-transform msg/type :inc :key :b}
```



```
(defn a-combine [c-state t-name
                 t-old-val t-new-val]
  (:a t-new-val))

(defn b-combine [c-state t-name
                 t-old-val t-new-val]
  (:b t-new-val))

(defn total-combine [c-state inputs]
  (apply + (map :new (vals inputs))))
```

```
([:value [:b-combine] 10 11] [:value [:total-combine] 21 22])
```

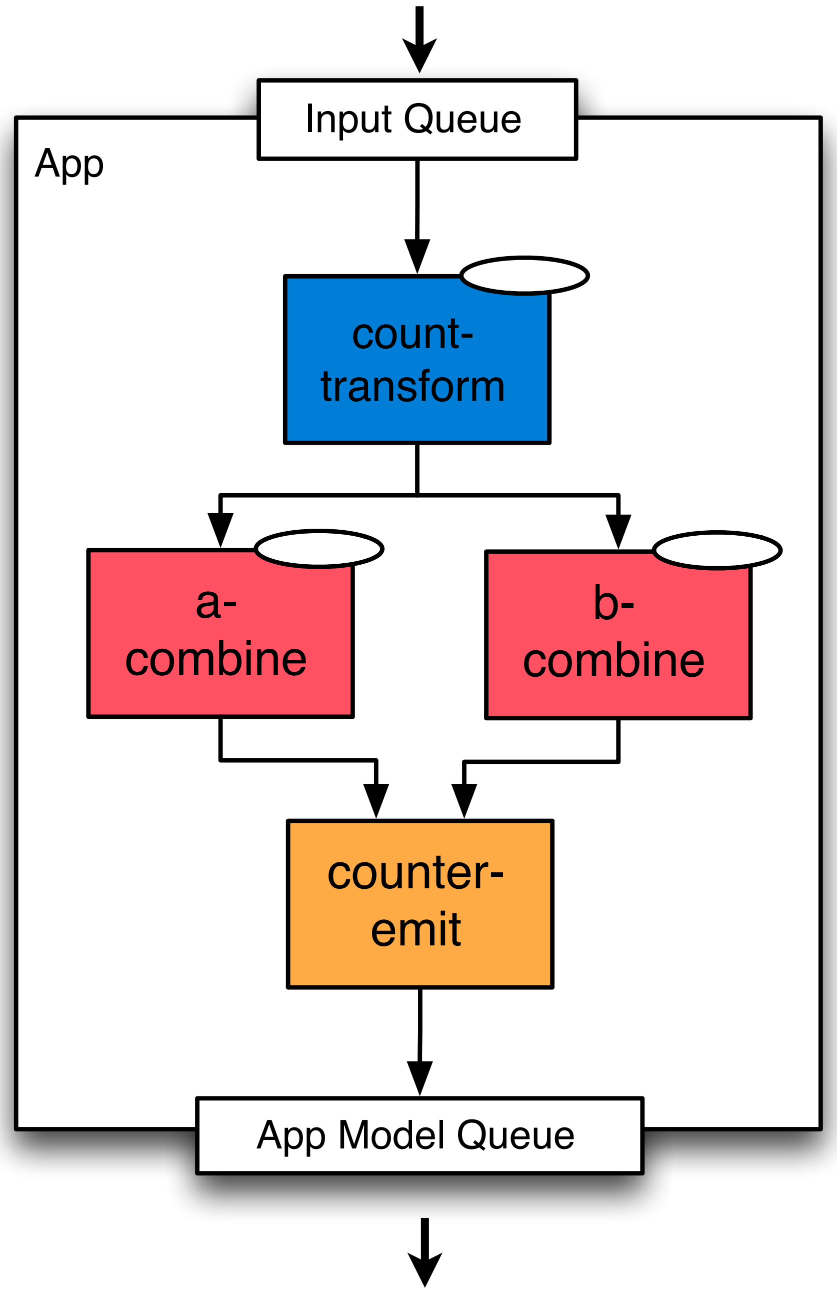
Emit



- Fn that converts state(s) to tree deltas
- Overrides default tree mapping

Emit

```
{msg/topic :count-transform msg/type :inc :key :b}
```



```
(defn counter-emit
  ([inputs] [{:counter {:a {:value 0}
                        :b {:value 0}}}])
  ([inputs changed-inputs]
     (concat []
       (when (changed-inputs :a-combine)
         [[:value [:counter :a]
           (-> inputs :a-view :new)]])
       (when (changed-inputs :b-combine)
         [[:value [:counter :b]
           (-> inputs :b-view :new)]]))))
```

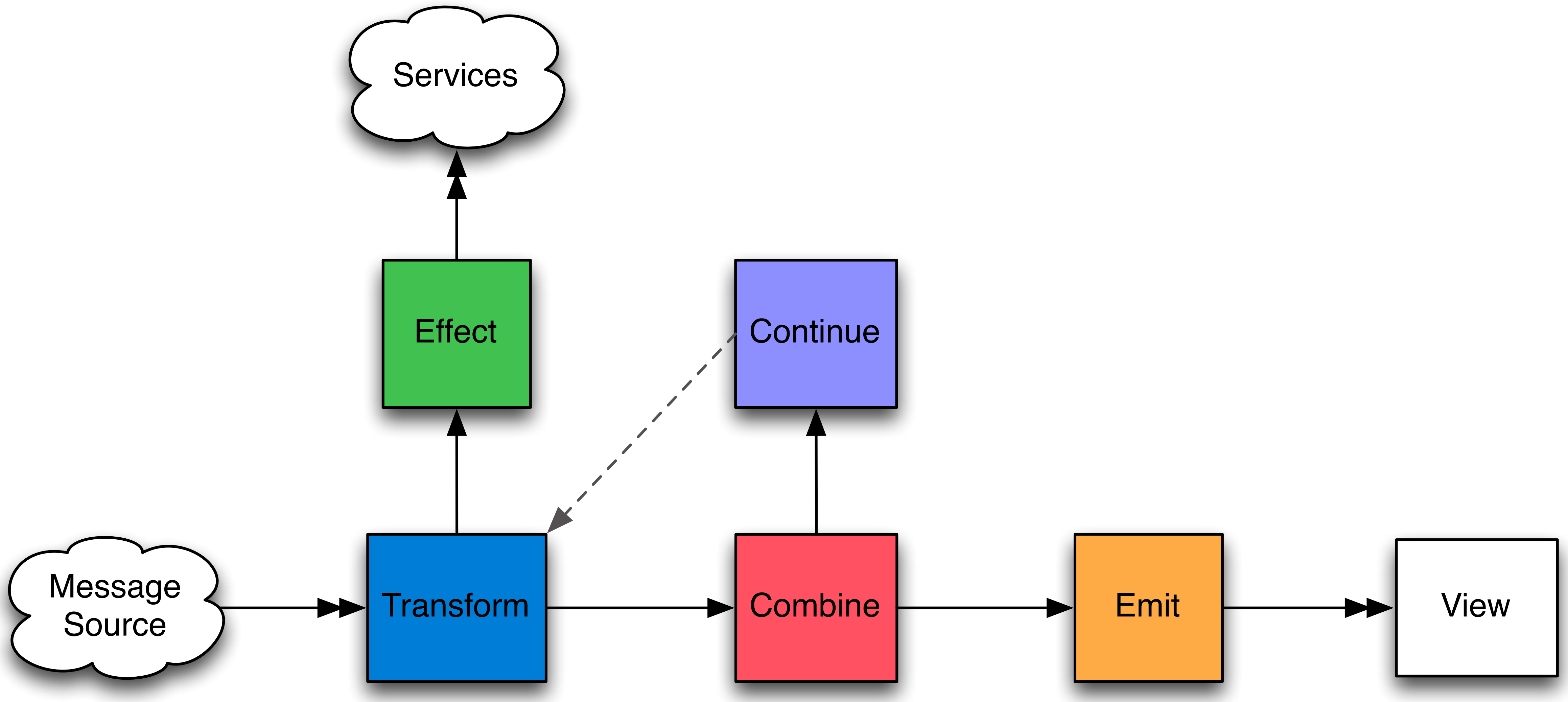
```
([:value [:counter :b] 11 12])
```

Messages in a flow

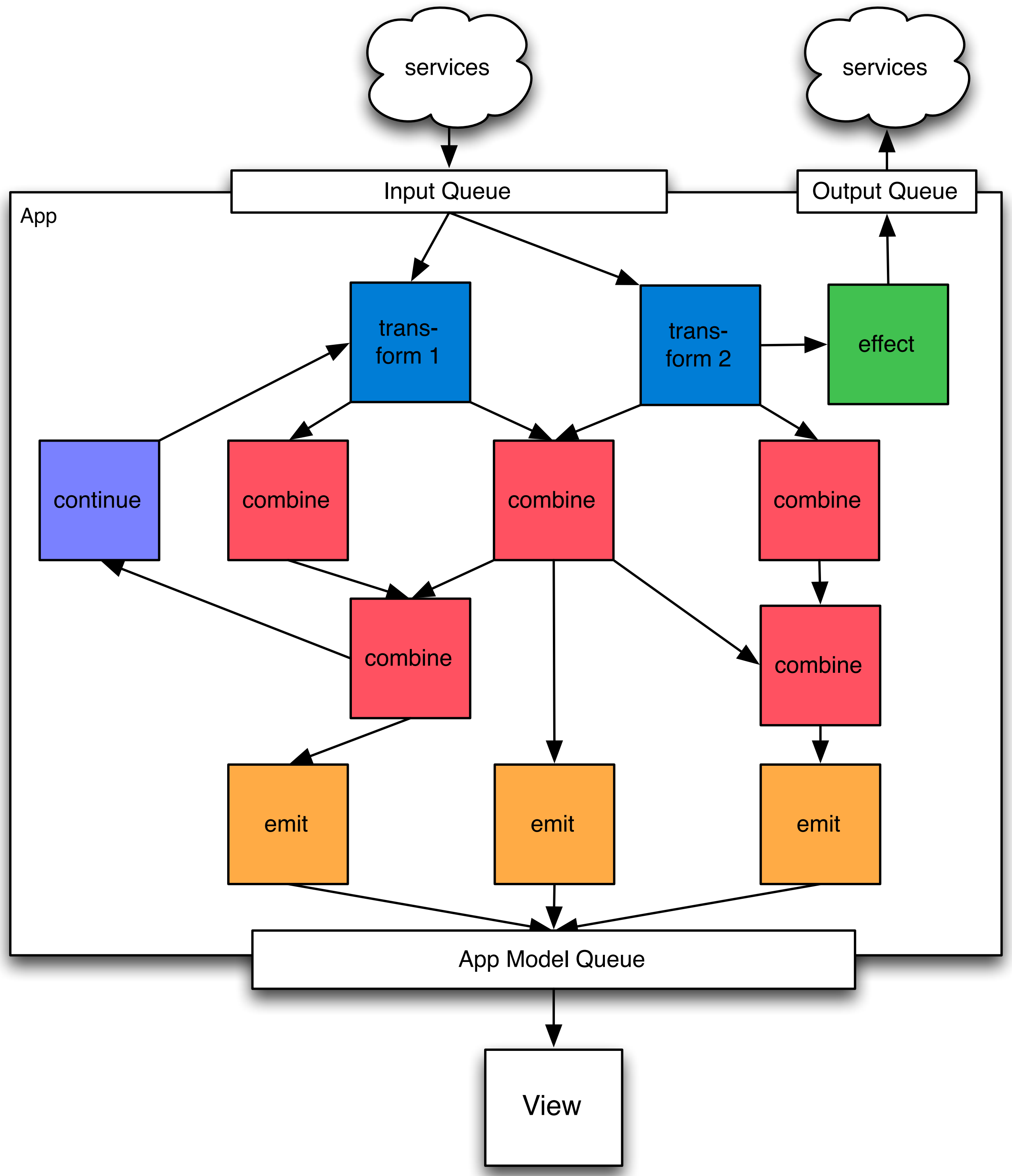
- Effect fn
  - transform or combine state input
  - msgs for services output
  - queued *after* flow

- Continue fn
  - combine state input
  - msgs for transforms output
  - sent *during* flow

All the pieces...

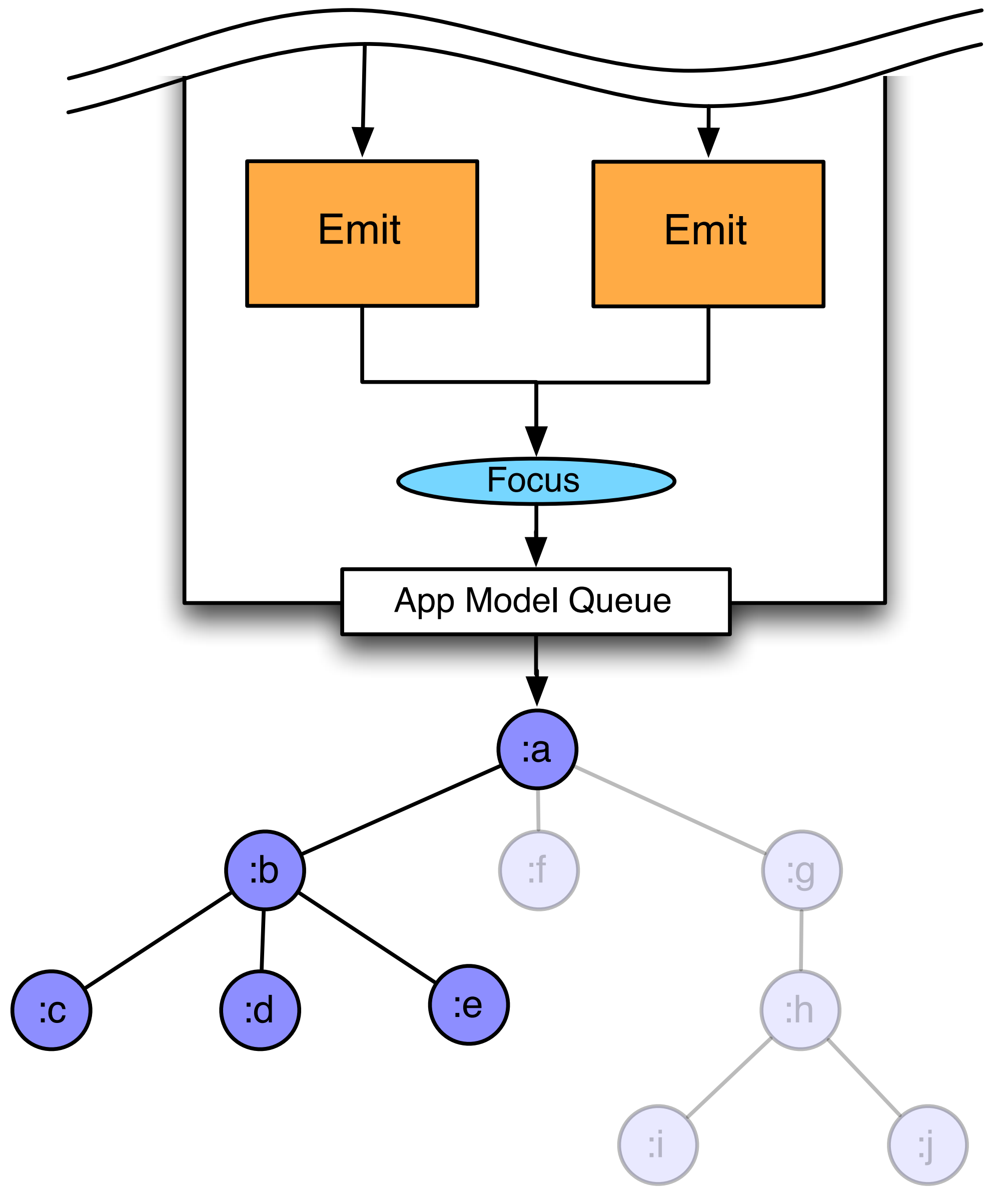


...put together



Focus

- Focus filters deltas
  - by name
  - by path
- Set by consumer
  - defaults to all
- Helpful "navigtion"



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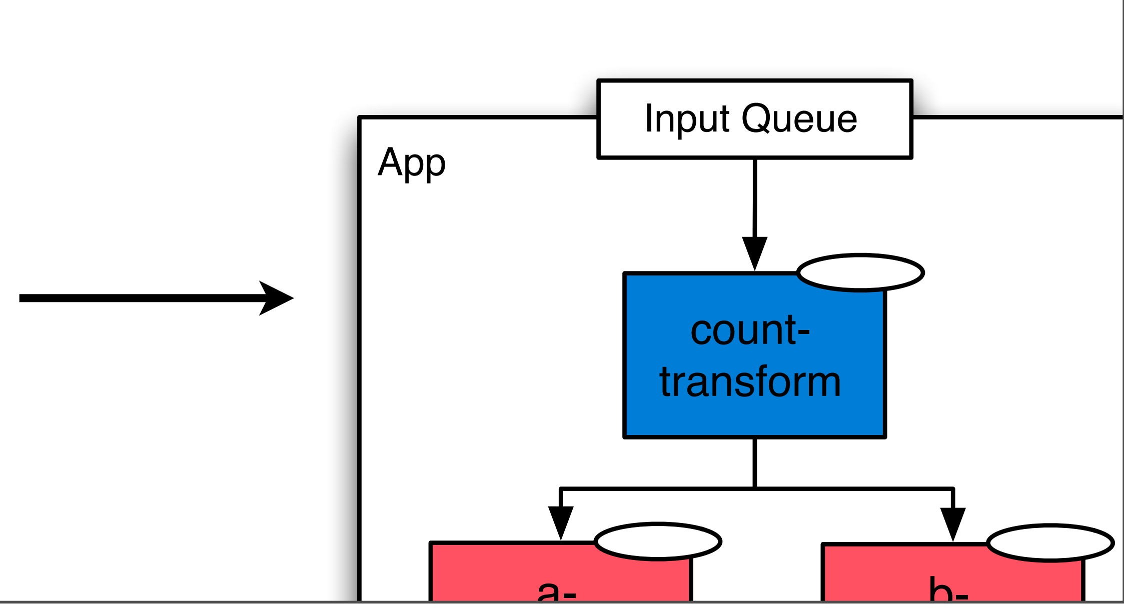
Benefits of data flow

- Write small pure fns
- No big comparator
- Let engine track state changes
- Only the necessary fns get called
- Projects all the way out to consumer

Making an App

```
(def counter-dataflow
  {:transform {:count-transform {:init {:a 0 :b 0}
                                 :fn transform-count}}
   :combine {:a-combine {:fn a-combine
                         :inputs #{:count-transform}}
             :b-combine {:fn b-combine
                         :inputs #{:count-transform}}}
   :emit {:counter-emit {:fn counter-emit
                         :inputs #{:a-combine :b-combine}}}})
```

```
(def app (app/build counter-dataflow))
```



Consuming App Output

- App produces logical tree deltas
- Provide a fn to consume them

```
(defn console-renderer [out]
  (fn [deltas input-queue]
    (binding [*out* out]
      (doseq [d deltas] (println d)))))

(def app-model
  (render/consume-app-model app (console-renderer *out*)))
(app/begin app)
```

View Model

- Encapsulate presentation logic and state
- Input: deltas from logical app tree
- Output: messages
- Implemented as fn(s) that
  - update UI
  - handle events

Push Renderers

- Map tree deltas to fns
- Maintain structure for portion(s) of tree in focus

op

path

fn

```
(def render-config
   [[:node-create []
     render-page]
    [:value [:counter :a]
     render-a-view]
    [:value [:counter :b]
     render-b-view]])

(def app-model
  (render/consume-app-model
    app
    (push/renderer
      render-config)))
```

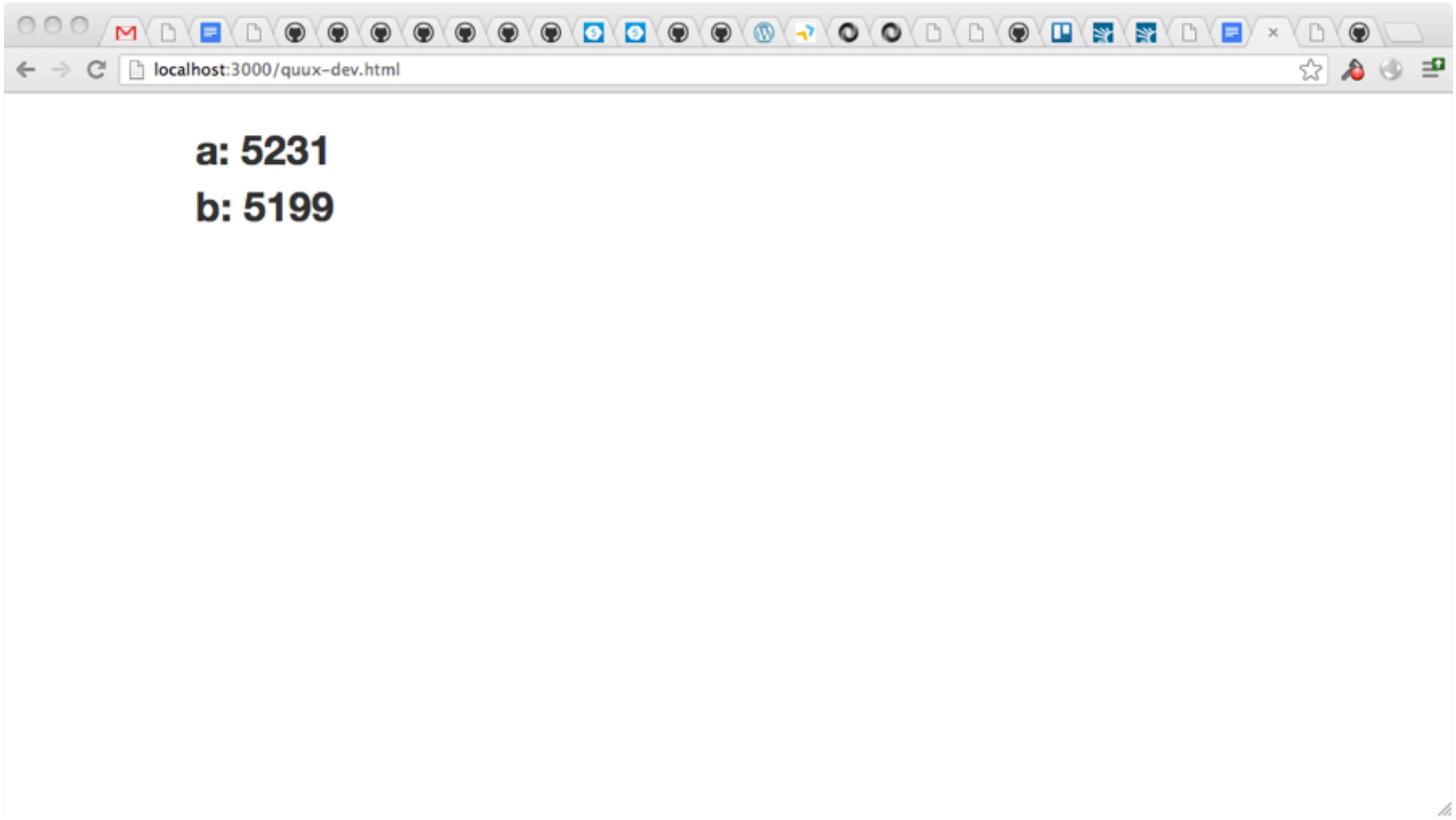
Simple render fns

```
(defn render-page
  [renderer [op path old-value new-value] input-queue]
  (dom/append! (dom/by-id "content") "<h1 id=\"a\">a</h1>")
  (dom/append! (dom/by-id "content") "<h1 id=\"b\">b</h1>"))

(defn render-a-view
  [renderer [op path old-value new-value] input-queue]
   (dom/set-text! (dom/by-id "a") (str "a: " new-value)))

(defn render-b-view
  [renderer [op path old-value new-value] input-queue]
   (dom/set-text! (dom/by-id "b") (str "b: " new-value)))
```

Result!



```
a: 5231
b: 5199
```

Problems

- ~~Services notifying apps~~
- ~~Building complex UIs in browser~~

App / View Benefits

- Clean separation of concerns
- Build, test app outside browser
- Generic data renderer can drive app before UI is ready
- Record/playback changes to build, test, debug rendering code

Getting Started

- Run chat sample, look at app and service code
- lein new pedestal-service my-service
- lein new pedestal-app my-app

Thanks!

- http://pedestal.io
- http://thinkrelevance.com