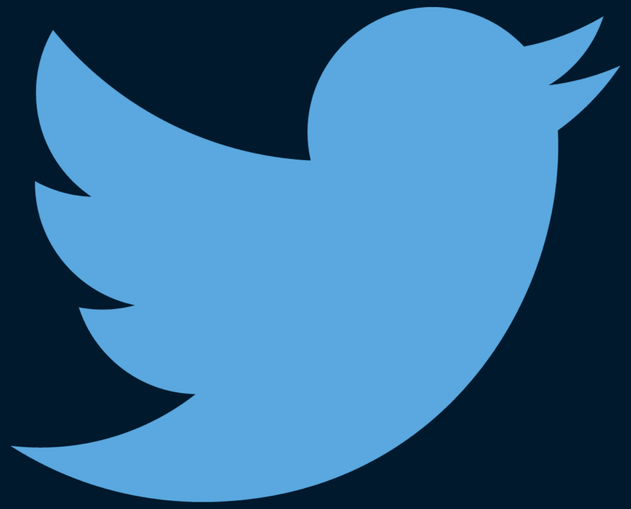
Simplifying the data layer

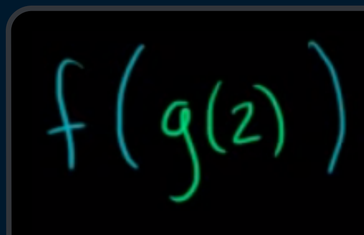
Kevin Robinson
@krob



fabric


answers
No analysis required.
Finally, mobile app analytics you don't need to analyze.

React!



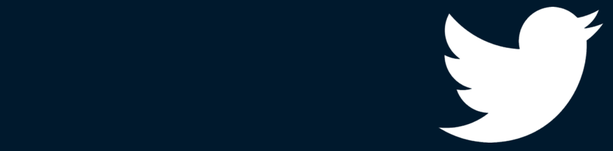
The data layer

Sharing information

Optimistic updates, offline

Real-time data, collaboration

Express this **simply** and **directly**

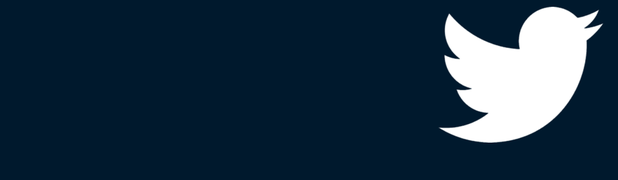


Simplifying

Collaborating across the stack

Push effects out to the edge

Embrace the log



Simplifying

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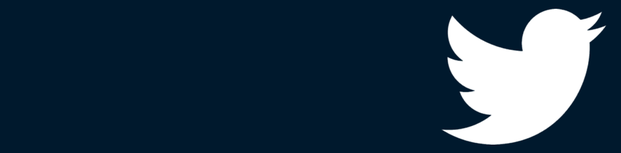
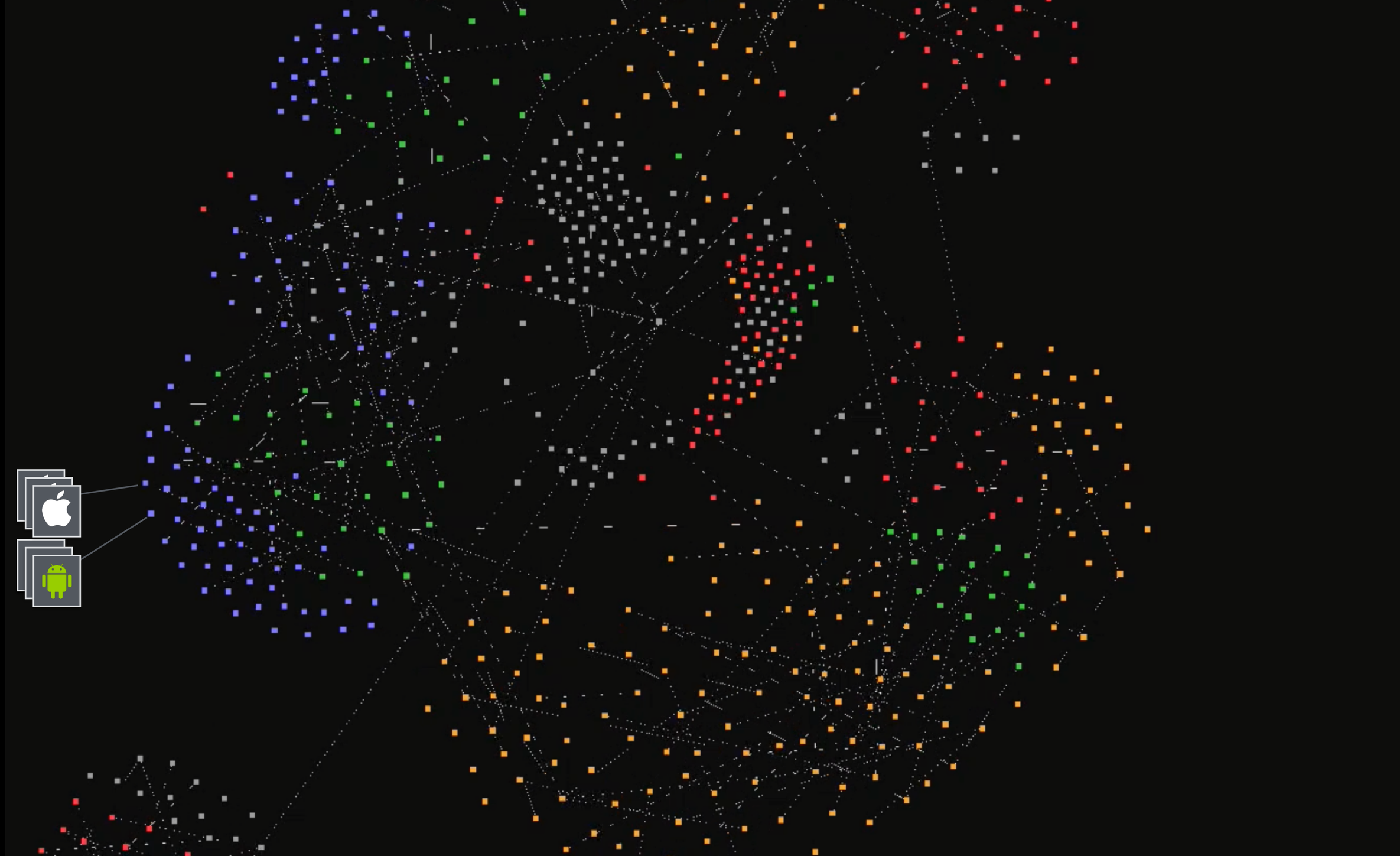
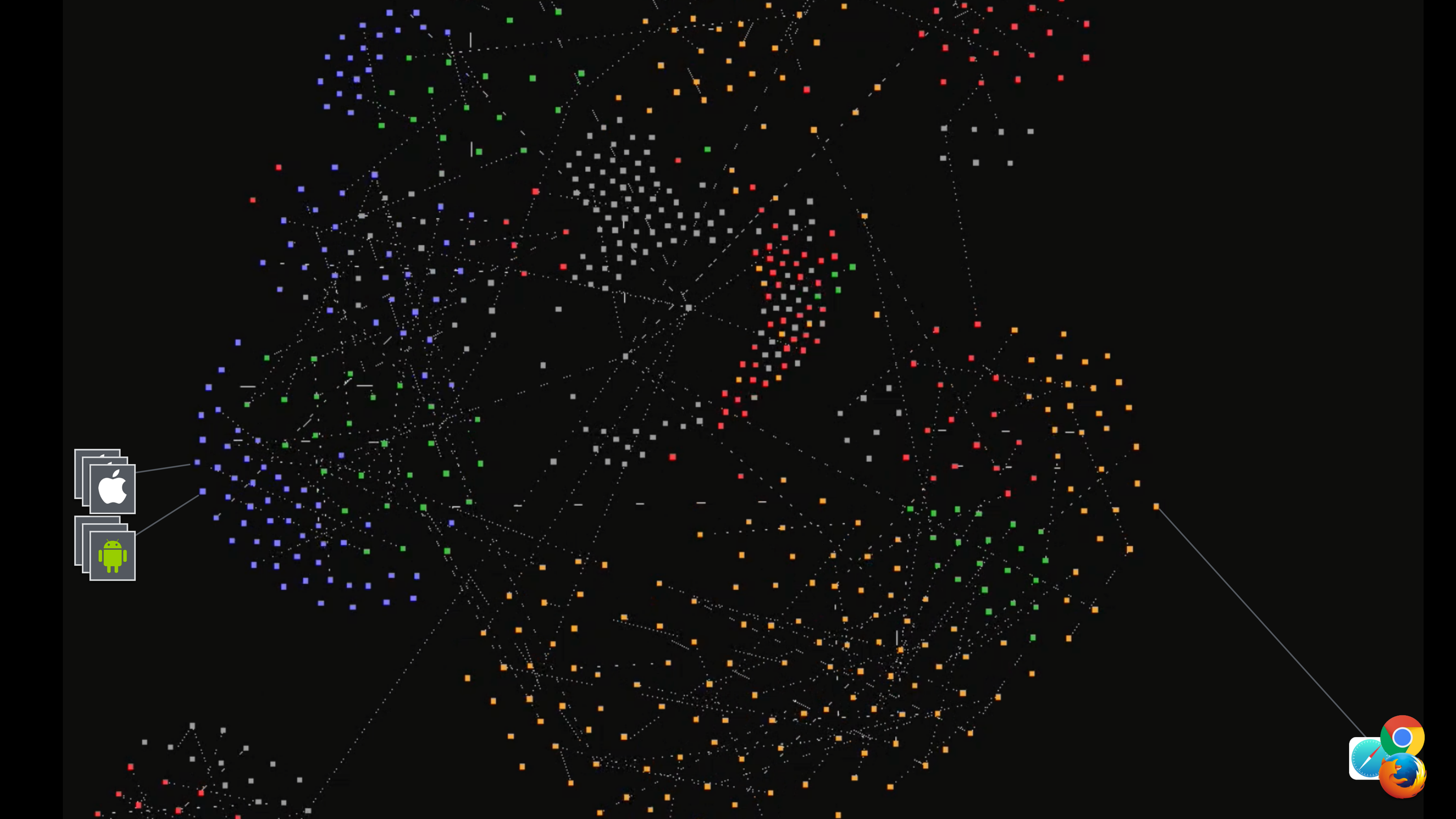






Computers are for humans

Computers are for humans

Acknowledge latency

Events coming in at over 100M/min

Can’t push it all

Lambda architecture

Log, with different computed “views”

Optimized for product development

Fast, eventually consistent endpoints

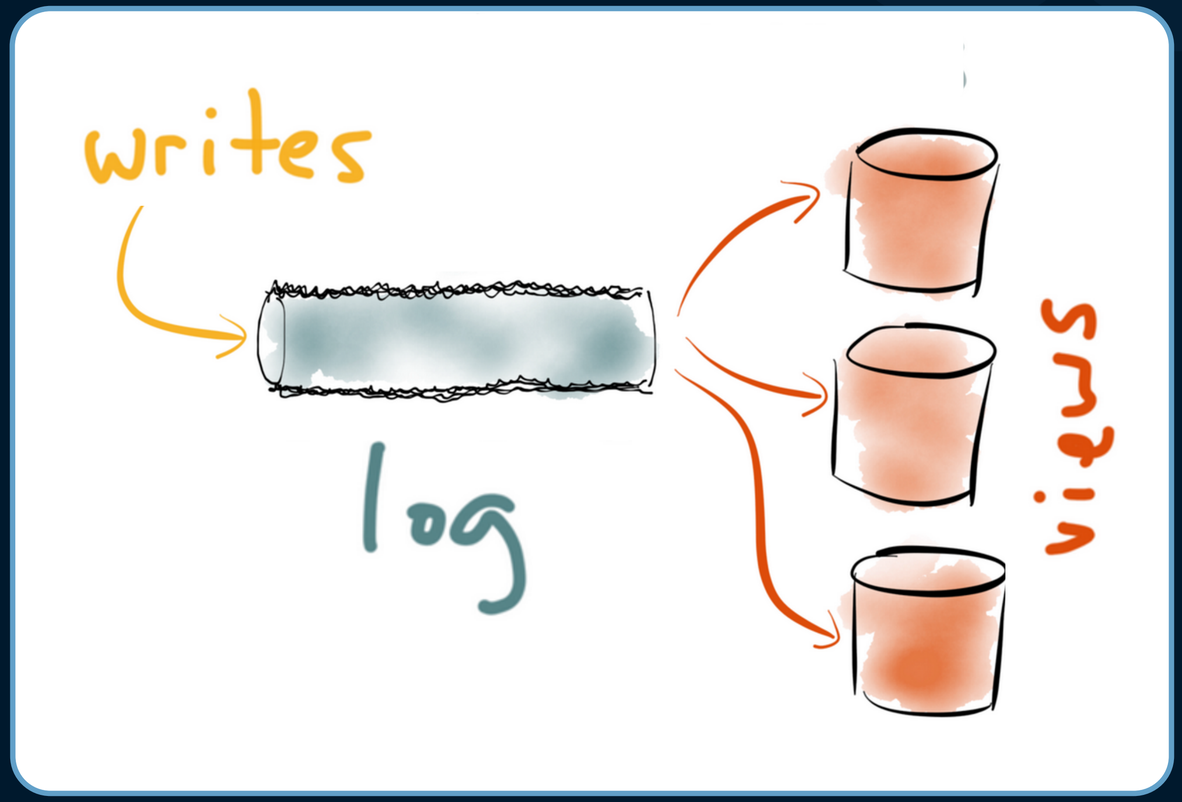
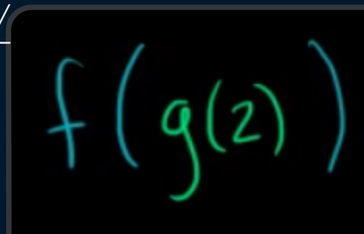


Diagram: http://blog.confluent.io/2015/03/04/

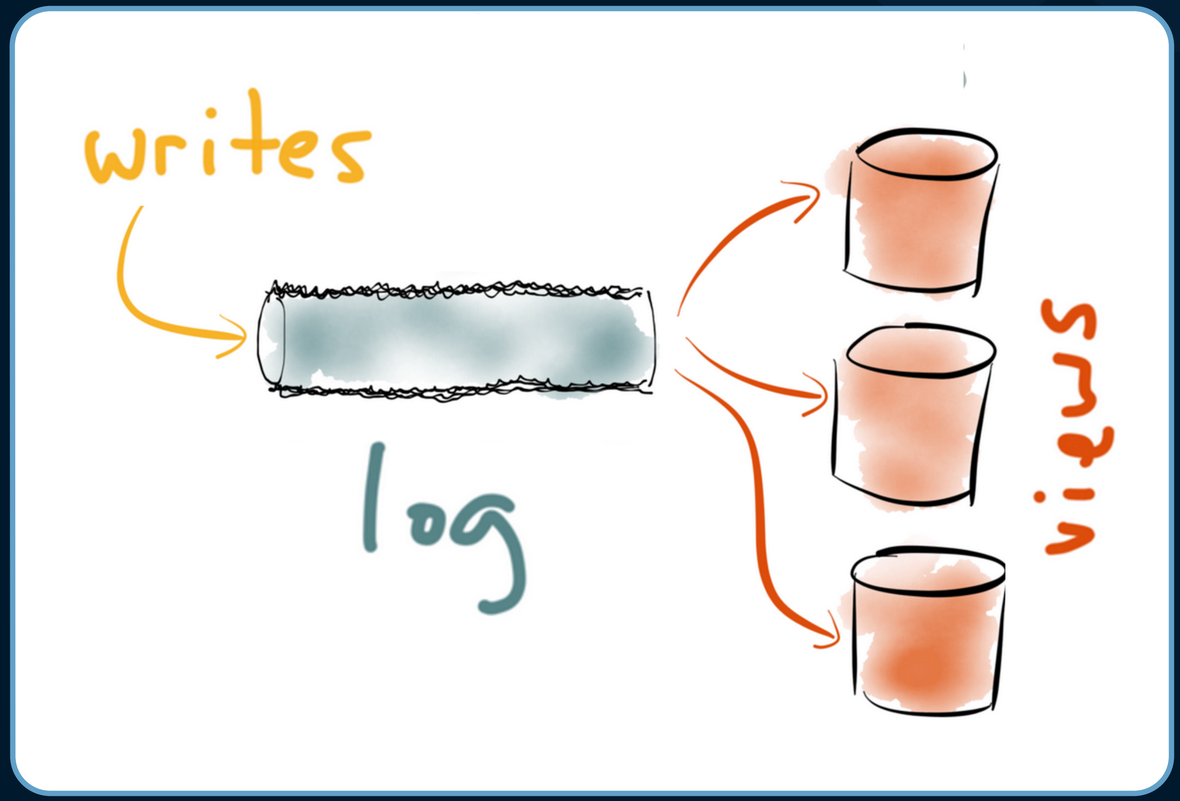


Lambda architecture

Log, with different computed “views”

Optimized for product development

Fast, eventually consistent endpoints



More details: https://blog.twitter.com/2015/handling-five-billion-sessions-a-day-in-real-time

Bound latency

Bound latency

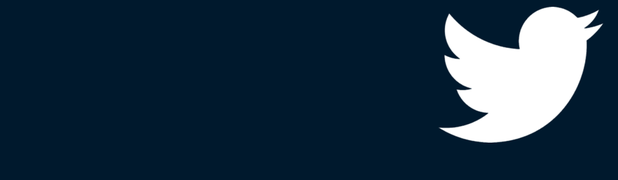
Bound latency

Simplifying

Collaborating across the stack

Push effects out to the edge

Embrace the log



Simplifying

Collaborating across the stack

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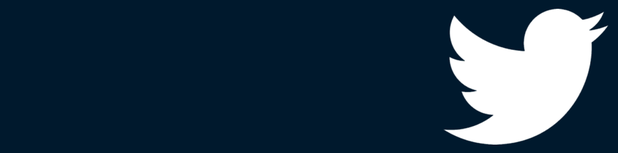

How do we describe this?

Flux

How do we describe this?

USERS COMPONENT

```
ActiveUsersWidget = React.createClass
  getInitialState: ->
    activeUsers: null

  componentDidMount() {
    this.activeUsersProcess = new ActiveUsersProcess({
      appId: this.props.appId,
      timeRange: this.props.timeRange,
      onDataReceived: this.onActiveUsersData
    });
    this.activeUsersProcess.start();
  }

  componentWillUnmount() {
    this.activeUsersProcess.close();
  }

  onActiveUsersData(activeUsers) {
    this.setState({ activeUsers });
  }

  render() {
```

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ACTIVE USERS PROCESS

Sharing across components

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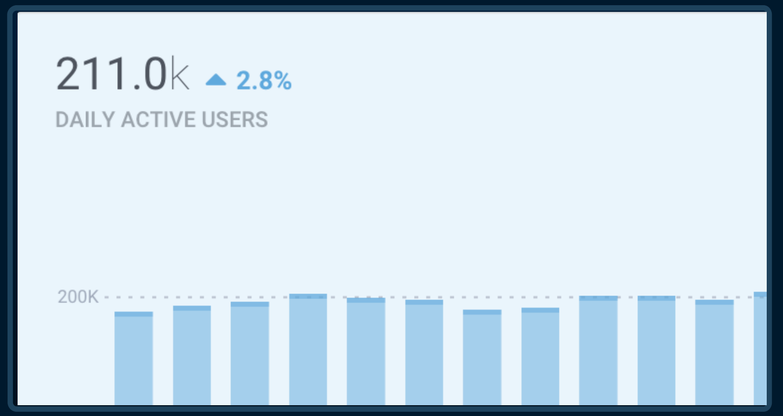
ACTIVE USERS PROCESS



Sharing across components

USERS COMPONENT

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ActiveUsersWidget = React.createClass
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    this.activeUsersProcess = new ActiveUsersProcess({
      appId: this.props.appId,
      timeRange: this.props.timeRange,
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```

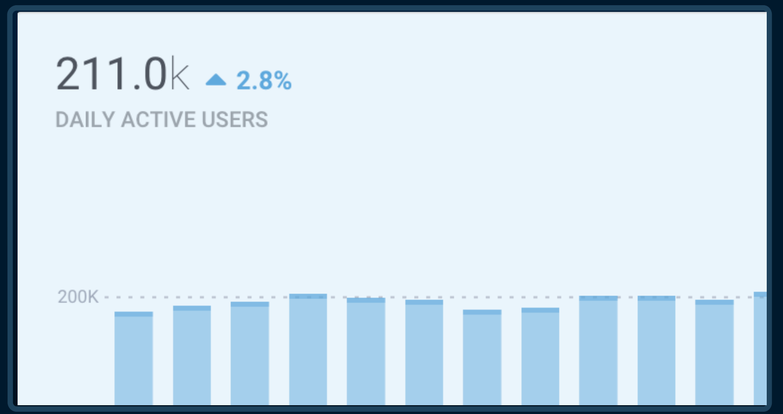
ACTIVE USERS PROCESS

EXPANDED USERS COMPONENT

```
ActiveUsersWidget = React.createClass
  getInitialState: ->
    activeUsers: null

  componentDidMount() {
    this.activeUsersProcess = new ActiveUsersProcess({
      appId: this.props.appId
```

ACTIVE USERS PROCESS



Joseph Savona
@en_JS

Following

The solution to async UI development is not async APIs: declarative, functional approaches are more powerful and easier to reason about.

RETWEETS
9

FAVORITES
16

4:57 PM - 11 Jun 2015

Push effects to the edge

DESCRIPTION OF DOM

```
render() {
  const latestValue = _.last(this.state.activeUsers).userCount;
  return (
    <AnswersWidget>
      <Heading
        title="Active users right now" value={latestValue} />
      <LogarithmicChart timeseries=this.state.{activeUsers} />
    </AnswersWidget>
  );
}
```

Push effects to the edge

DESCRIPTION OF PROCESSES

```
// This is what I want - components describe what
// processes they need as a function of props and state.
declareNeeds(props, state)  {
  return {
    activeUsers:
      processKey: ActiveUsersProceess.key
      params:
        appId: props.appId
        timeRange: props.timeRange
  };
}
```

Write declaratively

DESCRIPTION OF DOM

```
render() {
  const latestValue = _.last(this.state.activeUsers).userCount;
  return (
    <AnswersWidget>
      <Heading
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Write declaratively

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DESCRIPTION OF PROCESSES

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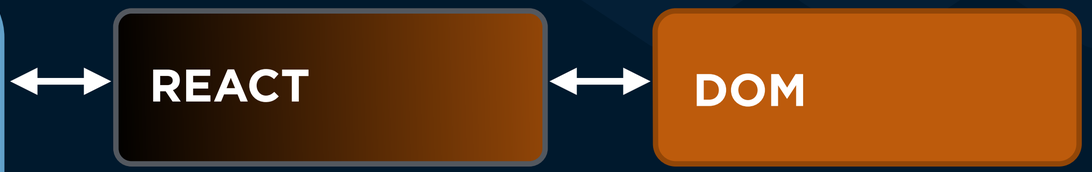
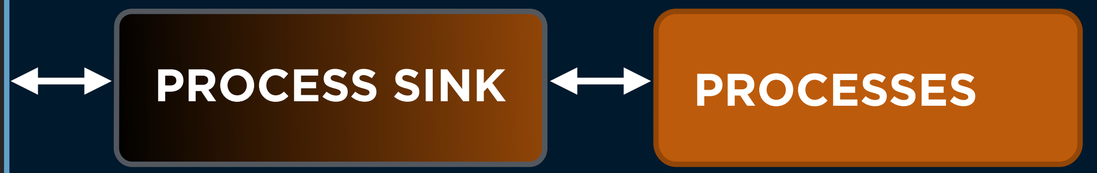
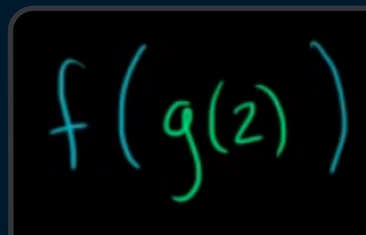
```





Functions are easy to factor

```
declareNeeds(props, state) {
  return {
    processKey: TopEventsProcess.key,
    params: {
      timeRange: props.timeRange
    }
  };
}
```

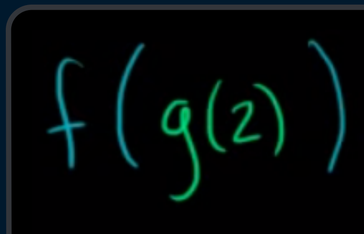


Functions are easy to factor

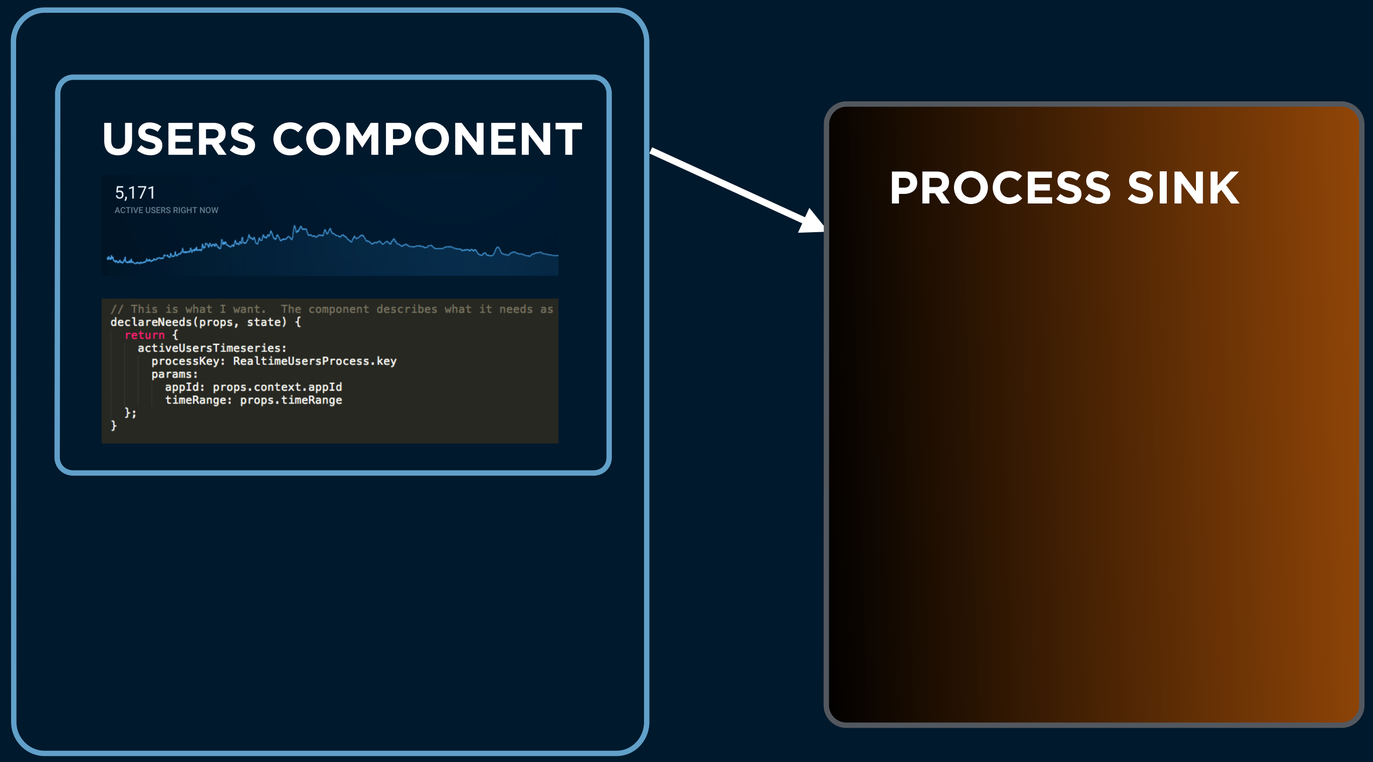
```
declareNeeds(props, state) {
  const topEventNeed = {
    processKey: TopEventsProcess.key,
    params: {
      timeRange: props.timeRange
    }
  };

  const topEventType = this.topEventType(state);
  const eventTimeseriesNeed = !topEventType ? {} : {
    processKey: EventTimeseriesProcess.key,
    params: {
      eventType: topEventType,
      timeRange: props.timeRange
    }
  };

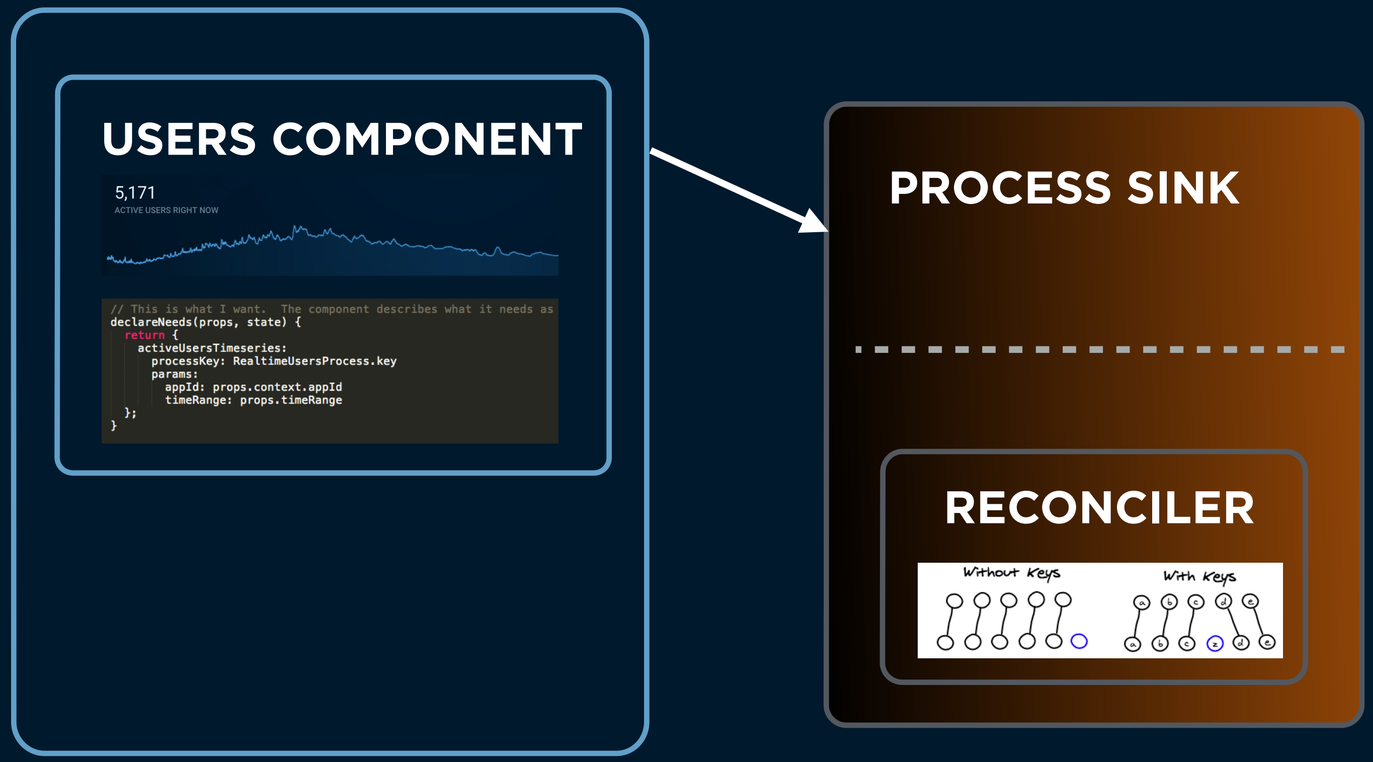
  return Object.assign({}, topEventNeed, eventTimeseriesNeed);
}
```



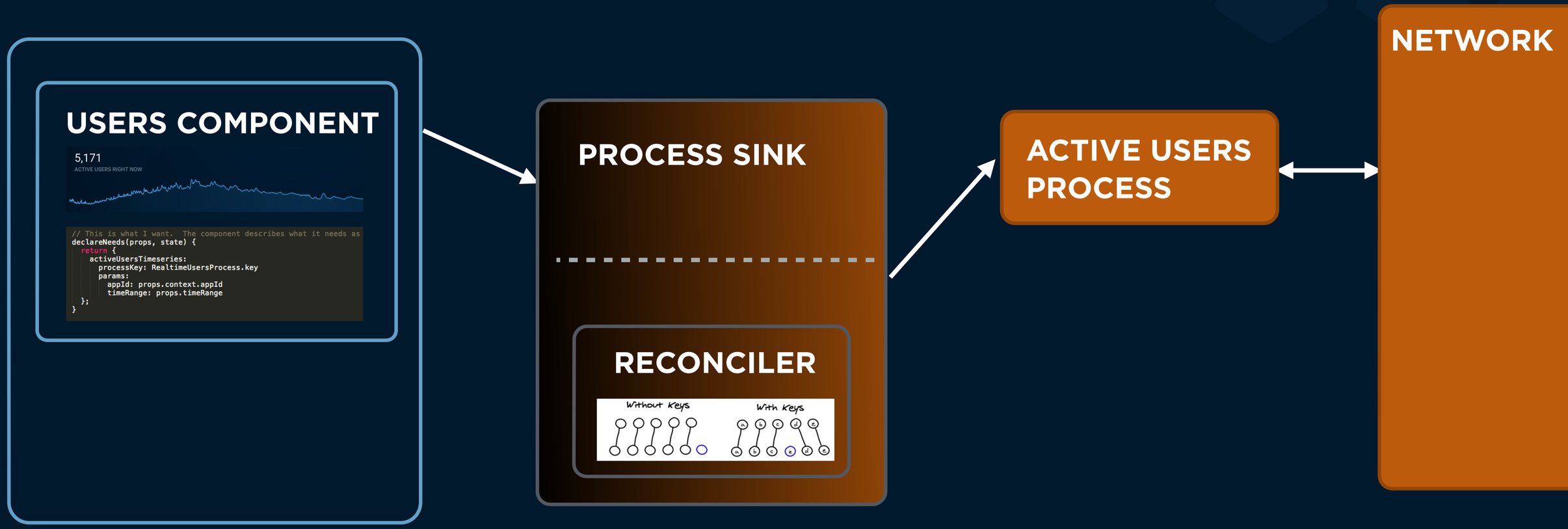
Components declare needs



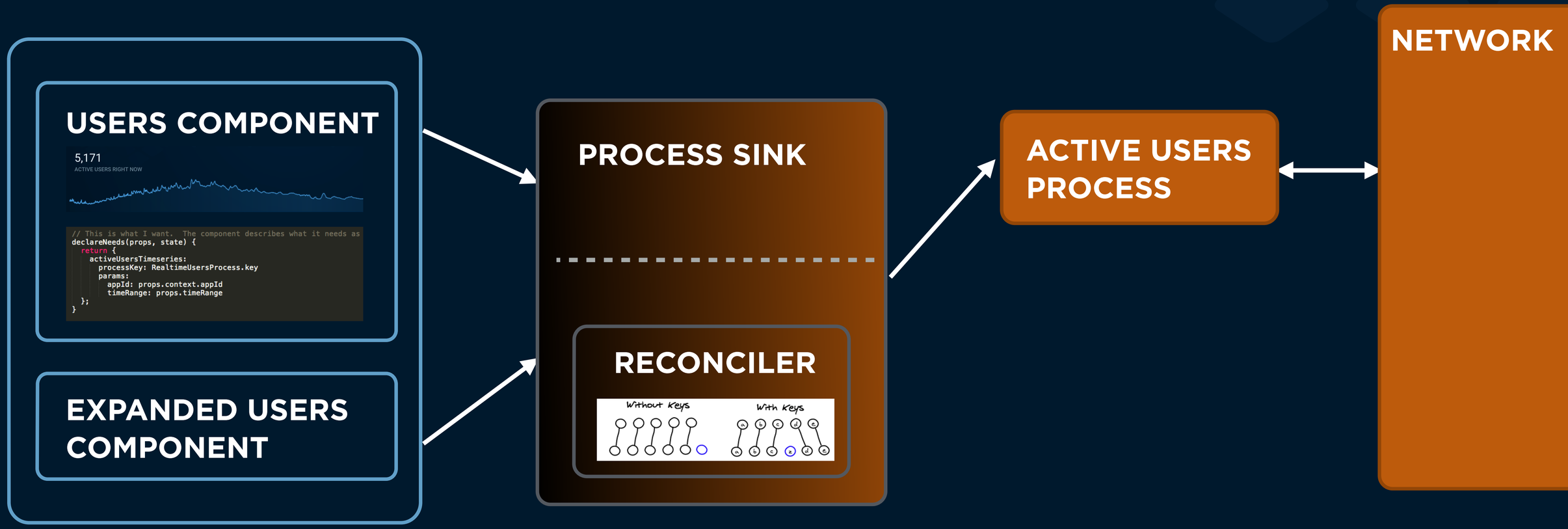
Library code interprets



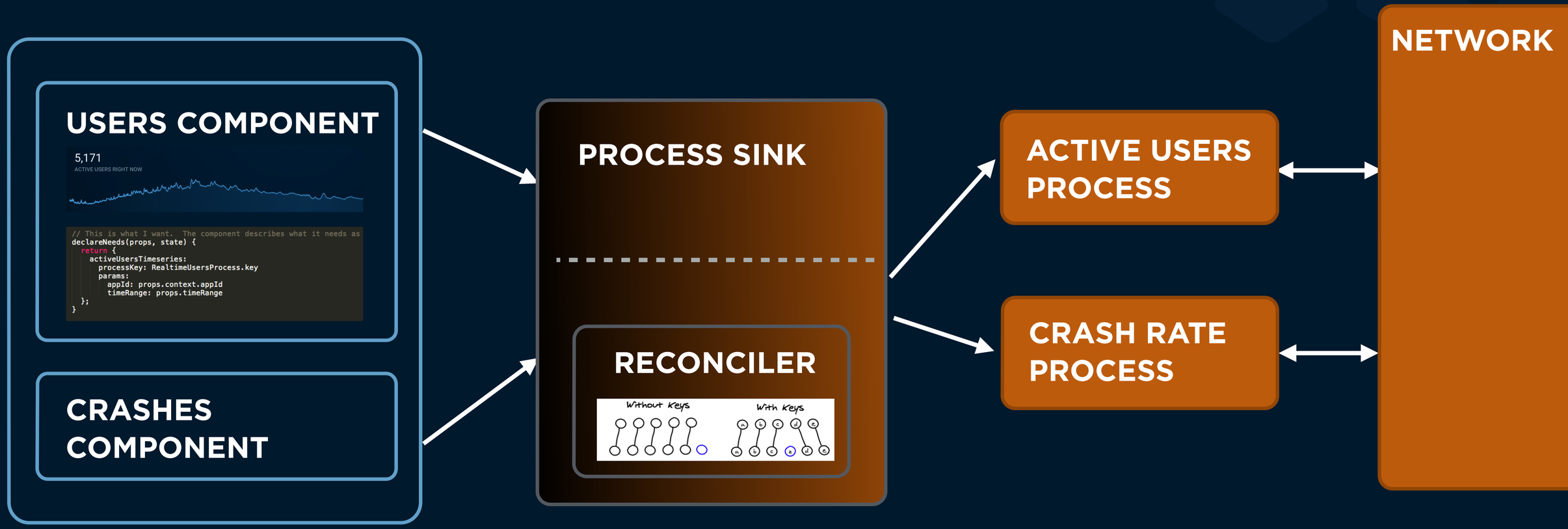
Library code reconciles



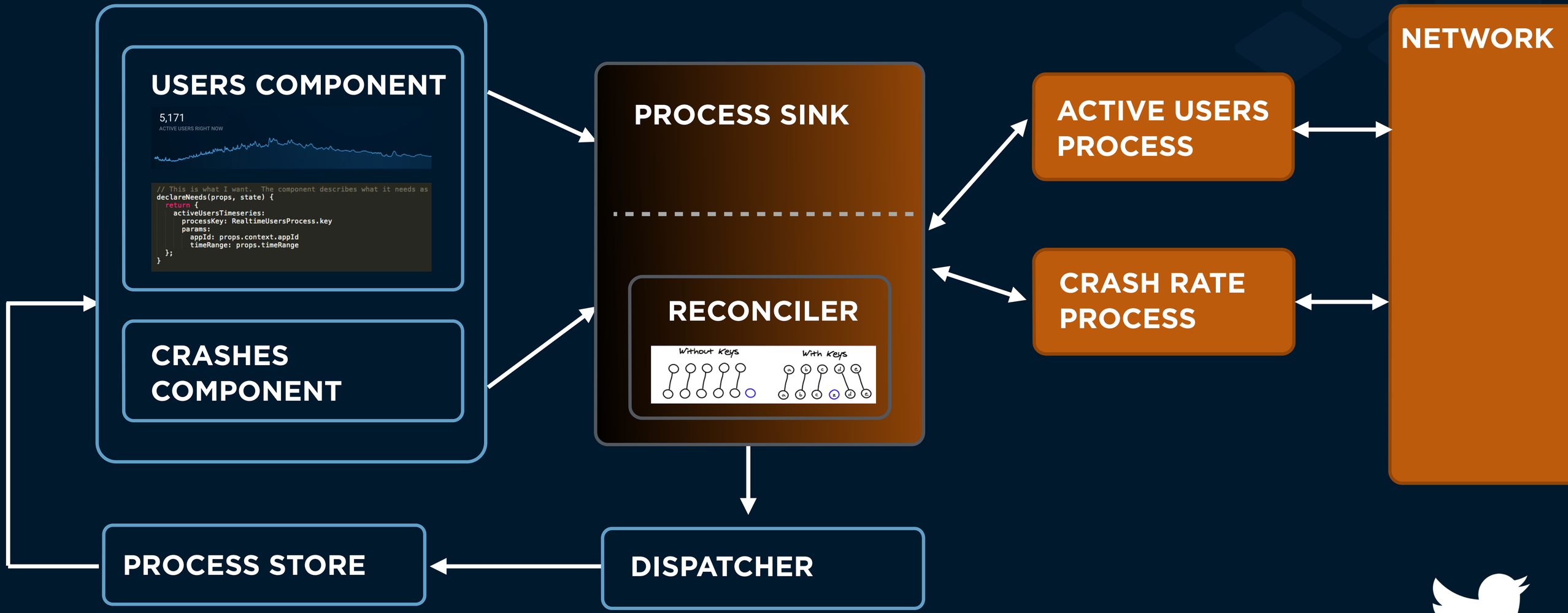
Share across components



Spin up processes as needed



Make data observable



Other applications

Server rendering

React Nexus

Composition

GraphQL, **Datalog**

Optimize requests

Relay, Om.next

Request and response

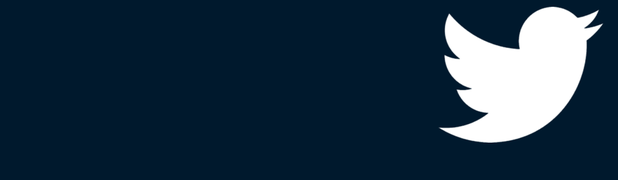
Elm

Simplifying

Collaborating across the stack

Push effects out to the edge

Embrace the log



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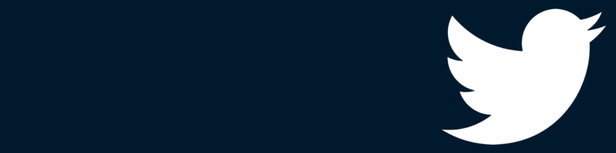
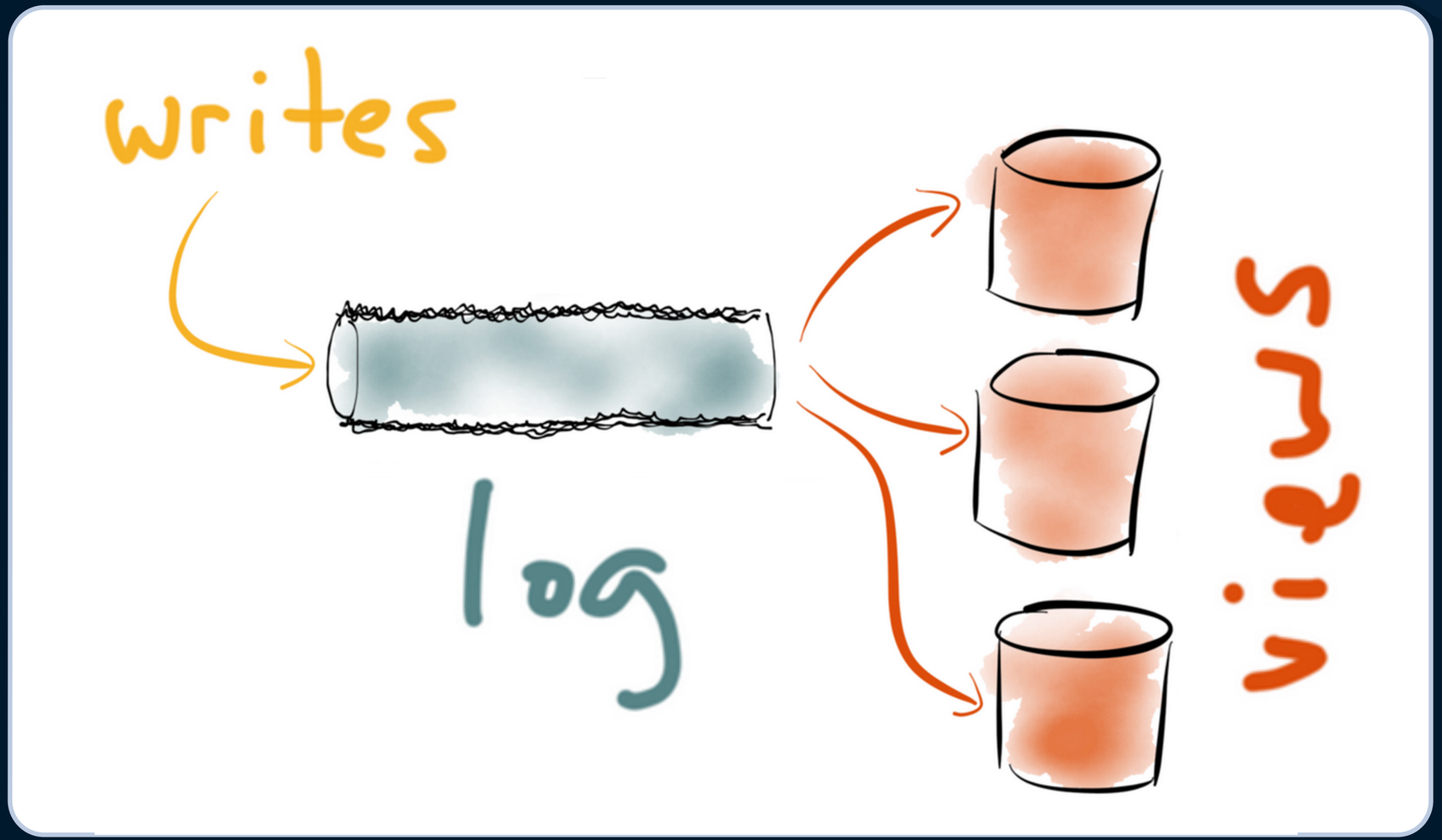


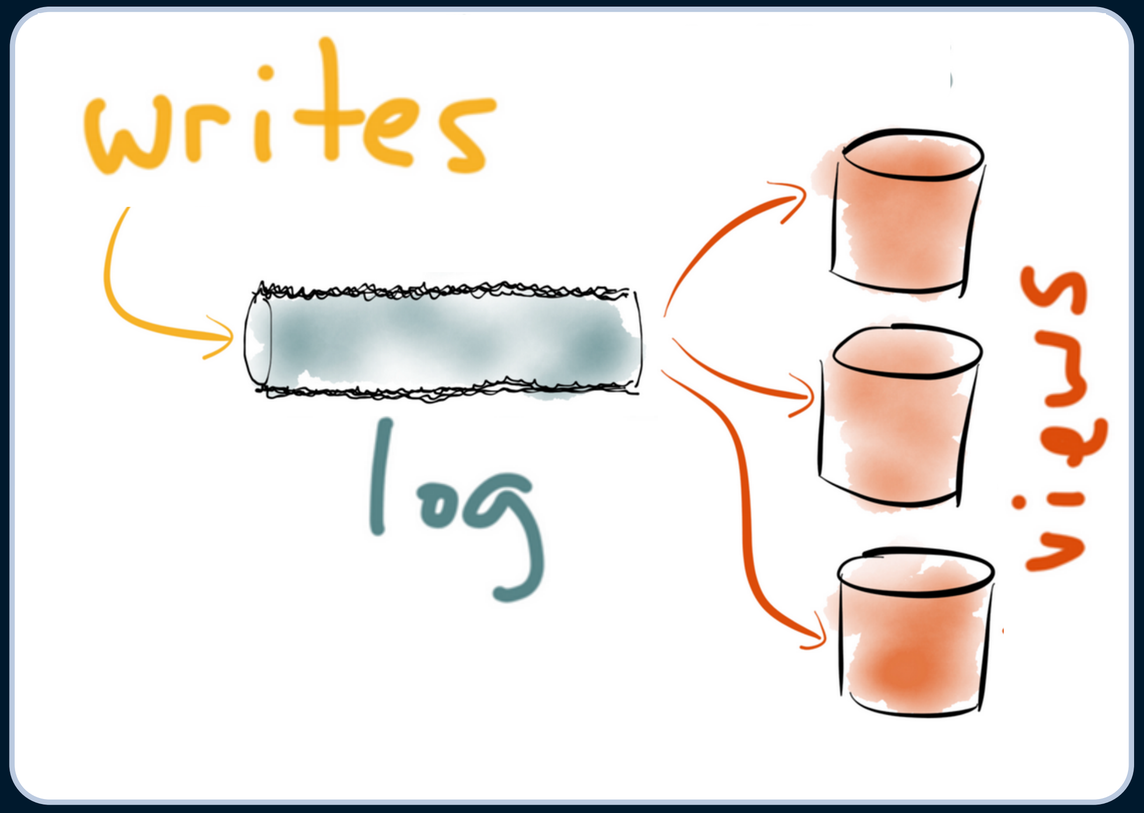
What?

Embrace the log



http://blog.confluent.io/2015/03/04/

Embrace the log

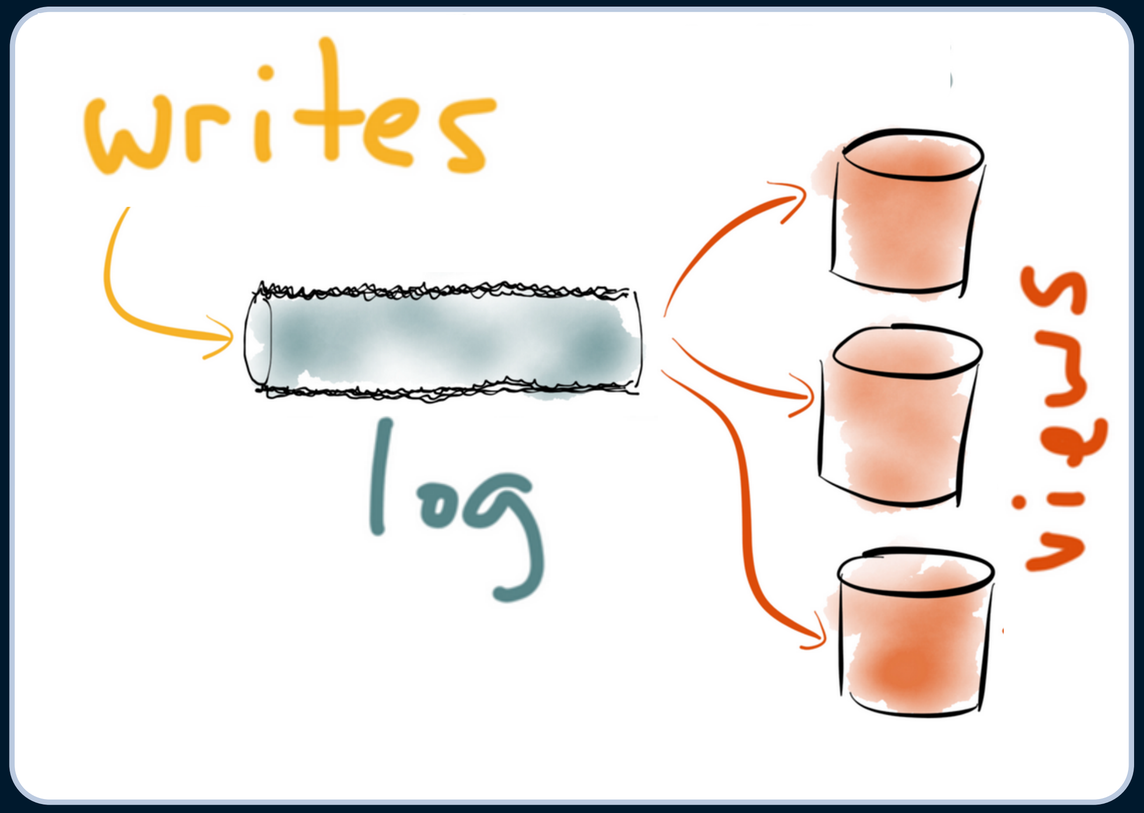


Writes:

~~mutate state in place~~

append-only stream of immutable facts

Embrace the log



Strengths

Isolation

Swapping computation

“Delay design”

Why?

Development superpowers

Hot reloading

Debugging

Recording user sessions

https://github.com/gaearon/redux

Data layer superpowers

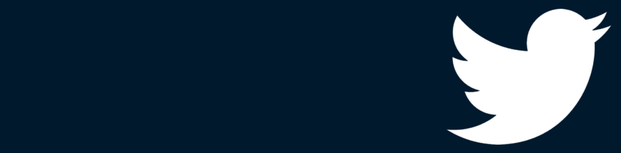
```
(aset js/window "undo"
  (fn [e]
    (when (> (count @app-history) 1)
      (swap! app-history pop)
      (reset! app-state (last @app-history)))))
```

https://github.com/omcljs/om

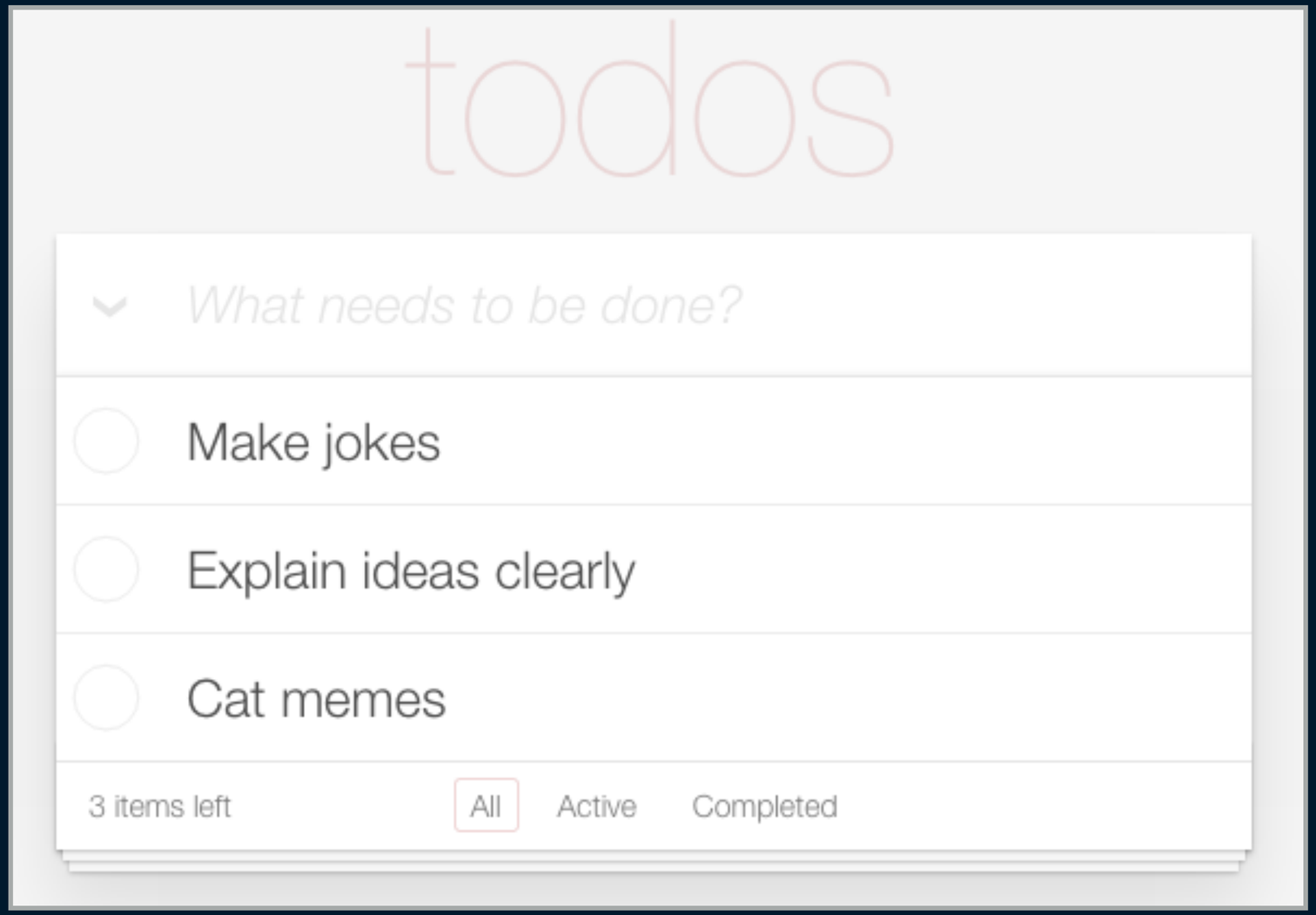
Real-time updates

Collaboration

Partial connectivity



Data layer superpowers



Embrace the log

```
timestamp  key                      payload
-------------------------------------------------------------------------------
 3000      USER_ADDED_TODO          {text: "Make jokes"}
 3005      CREATE_TODO_REQUEST      {request: {text: "Make jokes"}}
 3500      CREATE_TODO_RESPONSE     {request: {text: "Make jokes"}}, response: {id: 14}}
 6000      USER_ADDED_TODO          {text: "Explain ideas clearly"}
 8000      USER_ADDED_TODO          {text: "Cat memes"}
 ...
12000      TODOS_LIST_RESPONSE      [{id: 14, text: "Make funny jokes"}]
```

Embrace the log

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timestamp   key                       payload
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 8000       USER_ADDED_TODO           {text: "Cat memes"}
 ...
12000       TODOS_LIST_RESPONSE       [{id: 14, text: "Make funny jokes"}]
```


```
[ {id: 14, text: "Make jokes funny"} ]
```

Embrace the log

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 3005       CREATE_TODO_REQUEST       {request: {text: "Make jokes"}}
 3500       CREATE_TODO_RESPONSE      {request: {text: "Make jokes"}}, response: {id: 14}}
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 6000       USER_ADDED_TODO            {text: "Explain ideas clearly"}
 8000       USER_ADDED_TODO            {text: "Cat memes"}
 ...
12000       TODOS_LIST_RESPONSE        [{id: 14, text: "Make funny jokes"}]
```


```
[ {id: 14, text: "Make jokes funny"},
  {text: "Explain jokes clearly"},
  {text: "Cat memes"} ]
```

Embrace the log

```
timestamp  key                       payload
-------------------------------------------------------------------------------
 3000      USER_ADDED_TODO           {text: "Make jokes"}
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```

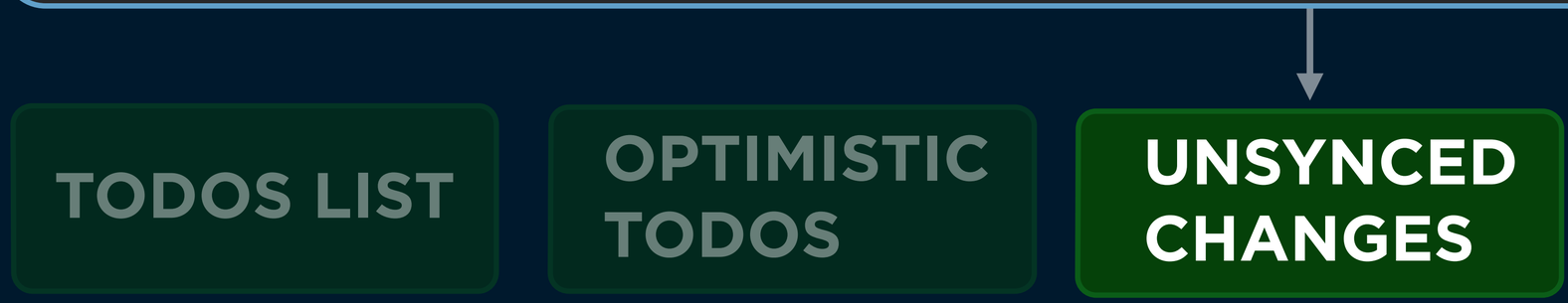
TODOS LIST

OPTIMISTIC TODOS

UNSYNCED CHANGES

Embrace the log

```
timestamp   key                       payload
-------------------------------------------------------------------------------
 3000       USER_ADDED_TODO           {text: "Make jokes"}
 3005       CREATE_TODO_REQUEST       {request: {text: "Make jokes"}}
 3500       CREATE_TODO_RESPONSE      {request: {text: "Make jokes"}}, response: {id: 14}}
 6000       USER_ADDED_TODO           {text: "Explain ideas clearly"}
 8000       USER_ADDED_TODO           {text: "Cat memes"}
 ...
12000       TODOS_LIST_RESPONSE       [{id: 14, text: "Make funny jokes"}]
```




```
[ {text: "Explain jokes clearly"},
  {text: "Cat memes"} ]
```

Embrace the log

```
timestamp   key                       payload
-------------------------------------------------------------------------------
 3000       USER_ADDED_TODO           {text: "Make jokes"}
 3005       CREATE_TODO_REQUEST       {request: {text: "Make jokes"}}
 3500       CREATE_TODO_RESPONSE      {request: {text: "Make jokes"}}, response: {id: 14}}
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 ...
12000       TODOS_LIST_RESPONSE       [{id: 14, text: "Make funny jokes"}]
```

TODOS LIST

OPTIMISTIC TODOS

UNSYNCED CHANGES

HIGHLIGHT CONFLICTS

Embrace the log

```
timestamp   key                       payload
-------------------------------------------------------------------------
 3000       USER_ADDED_TODO           {text: "Make jokes"}
 3005       CREATE_TODO_REQUEST       {request: {text: "Make jokes"}}
 3500       CREATE_TODO_RESPONSE      {request: {text: "Make jokes"}}, response: {id: 14}}
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 ...
12000       TODOS_LIST_RESPONSE       [{id: 14, text: "Make funny jokes"}]
```

TODOS LIST

OPTIMISTIC TODOS

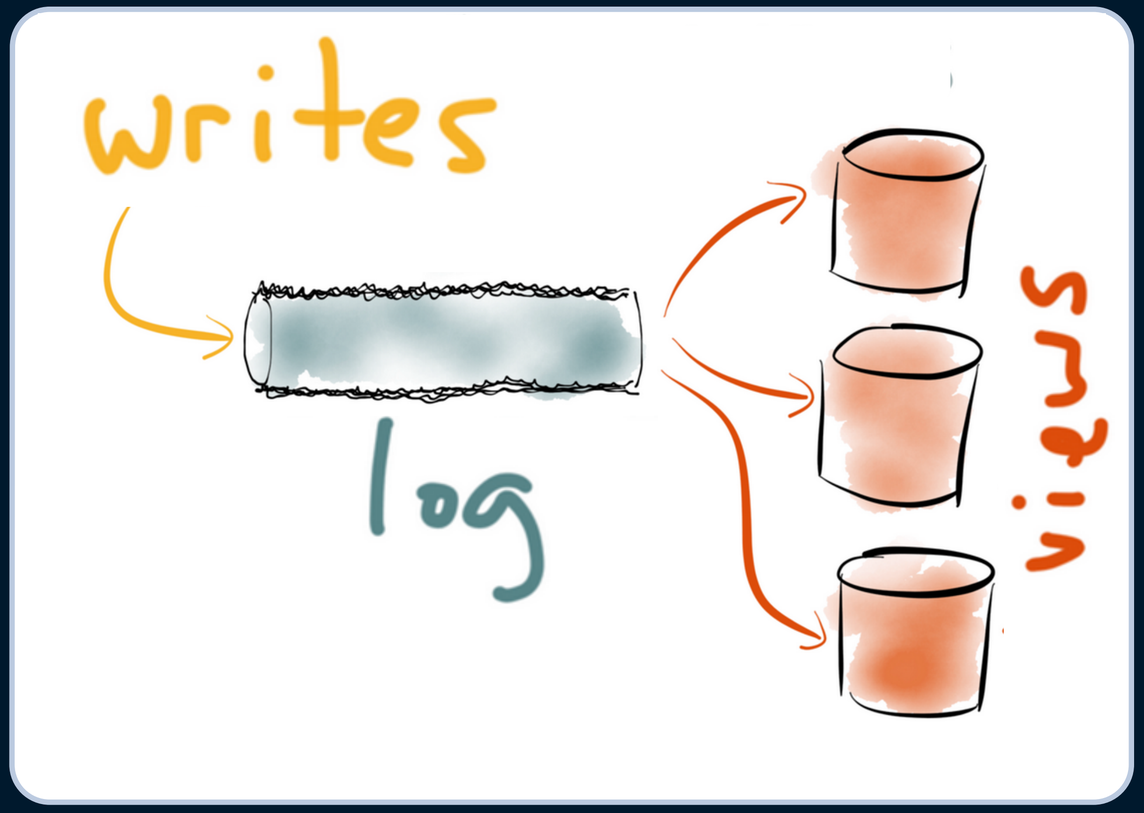
UNSYNCED CHANGES

HIGHLIGHT CONFLICTS

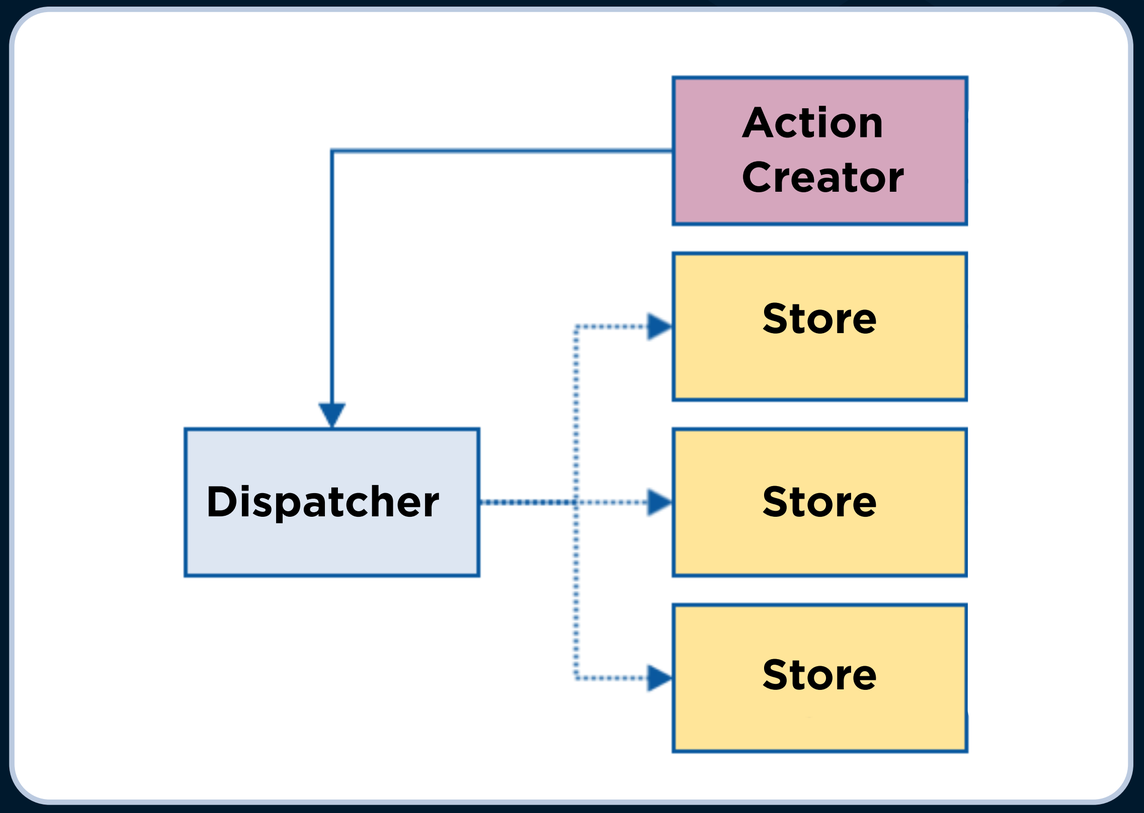
```
[ {local: {text: "Make jokes"},
   server: {id: 14, text: "Make jokes funny"}} ]
```

How?

Already partway there!



http://blog.confluent.io/2015/03/04/



http://fluxxor.com/what-is-flux.html

Already partway there!

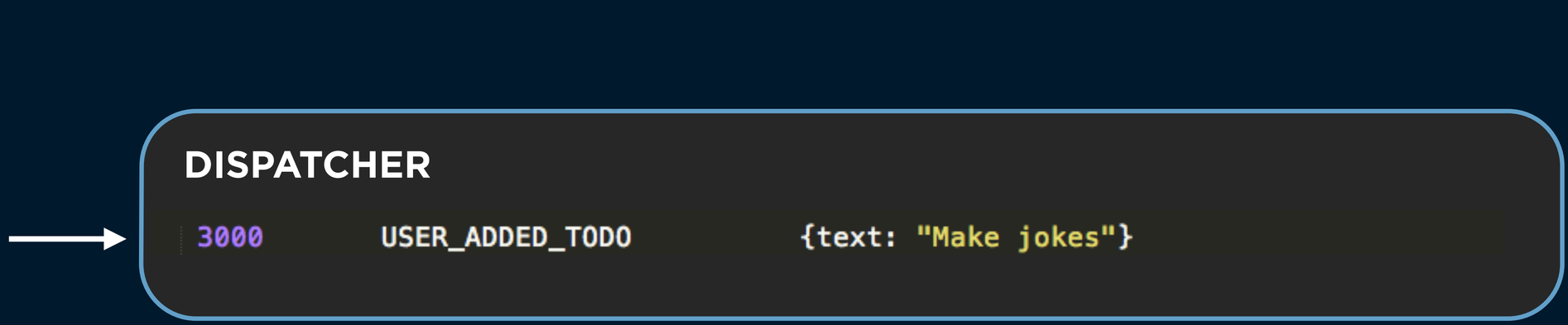
DISPATCHER

STORE

STORE

STORE

Already partway there!



STORE

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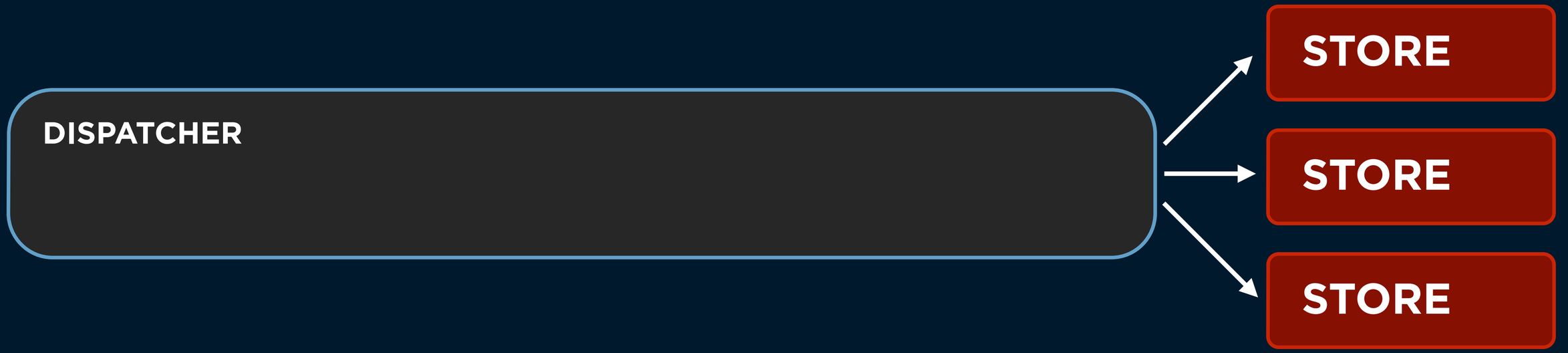
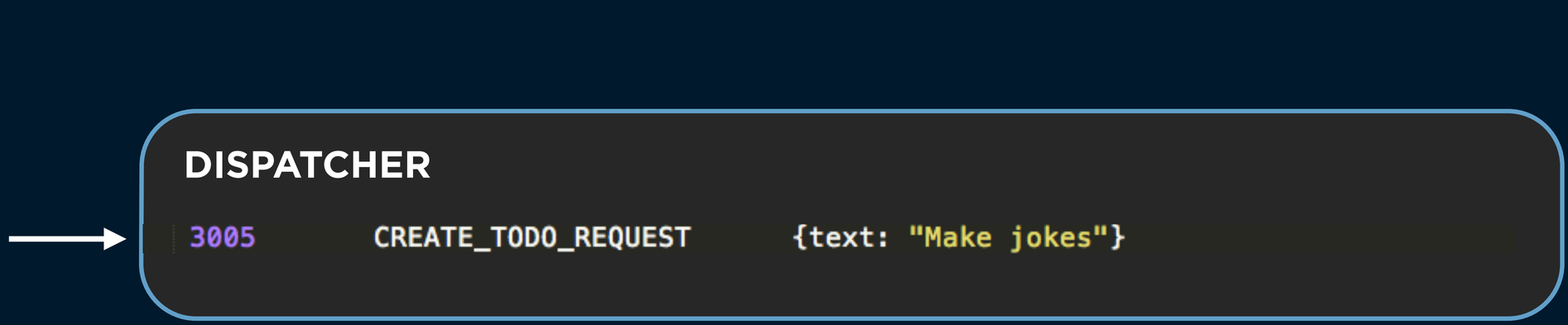
Already partway there!



Already partway there!



STORE

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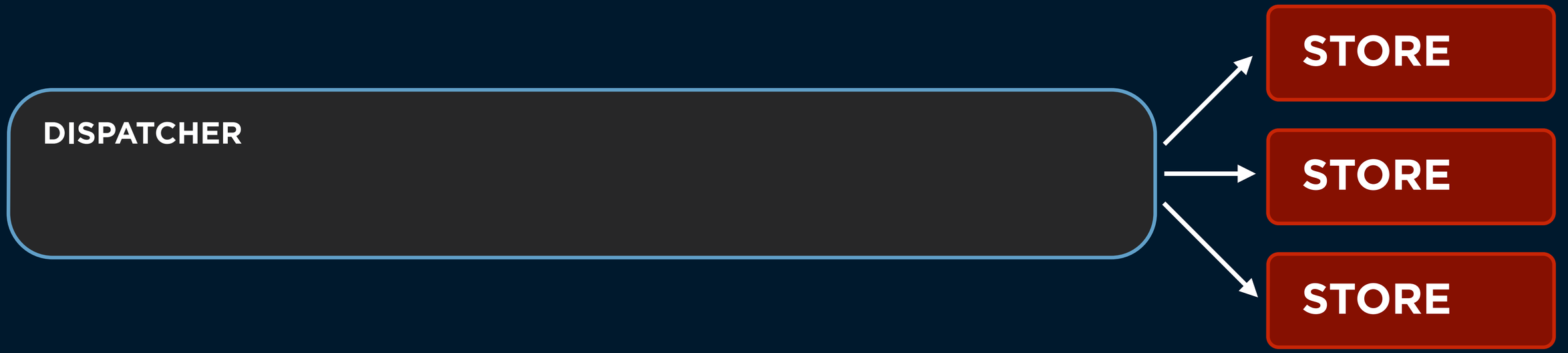
STORE

Already partway there!



Writes:

~~mutate state in place~~

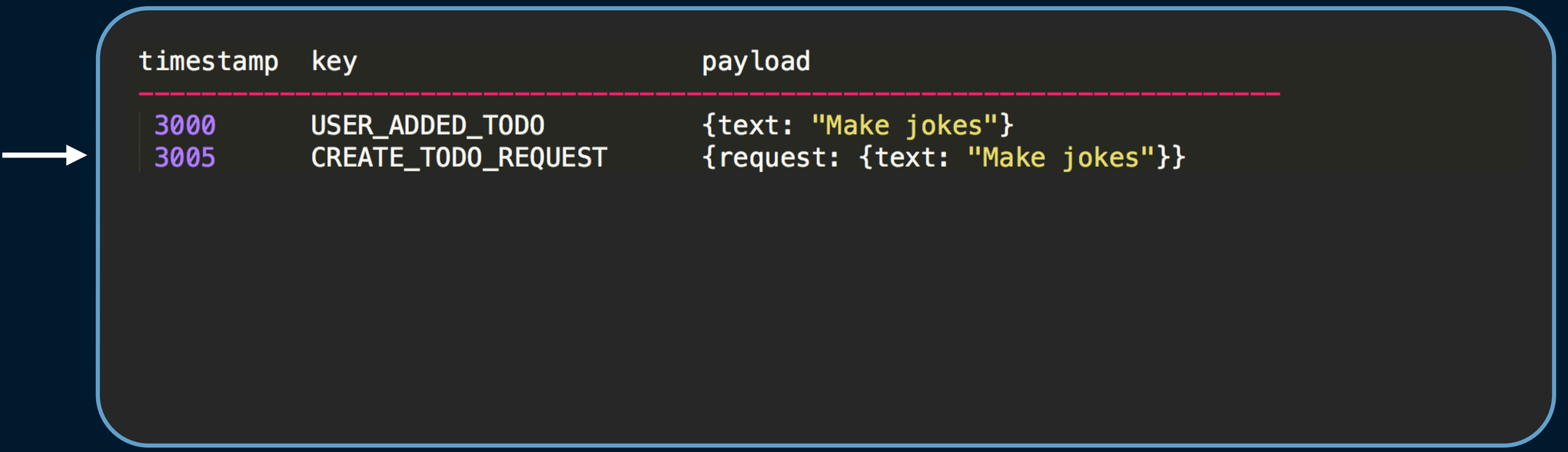
Writes:

append-only stream of immutable facts

Record facts

timestamp	key	payload
3000	USER_ADDED_TODO	{text: "Make jokes"}

Record facts



Record facts

timestamp	key	payload
3000	USER_ADDED_TODO	{text: "Make jokes"}
3005	CREATE_TODO_REQUEST	{request: {text: "Make jokes"}}
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...		
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...		
12000	TODOS_LIST_RESPONSE	[{id: 14, text: "Make funny jokes"}]

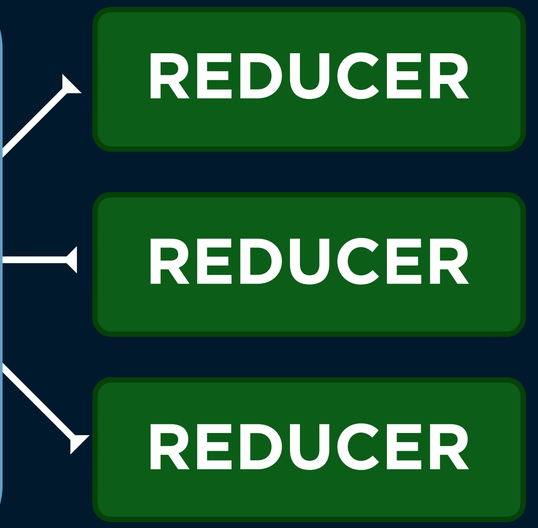
STORE

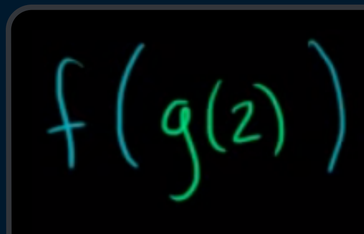
STORE

STORE

Compute views

```
timestamp   key                       payload
-------------------------------------------------------------------------------
 3000       USER_ADDED_TODO           {text: "Make jokes"}
 3005       CREATE_TODO_REQUEST       {request: {text: "Make jokes"}}
 3500       CREATE_TODO_RESPONSE      {request: {text: "Make jokes"}}, response: {id: 14}}
 6000       USER_ADDED_TODO           {text: "Explain ideas clearly"}
 8000       USER_ADDED_TODO           {text: "Cat memes"}
 ...
12000       TODOS_LIST_RESPONSE       [{id: 14, text: "Make funny jokes"}]
```





Reducers

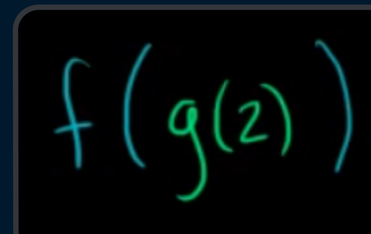
Stores are a function of the actions fired on them

```
f(state, [...actions]) → newState
```

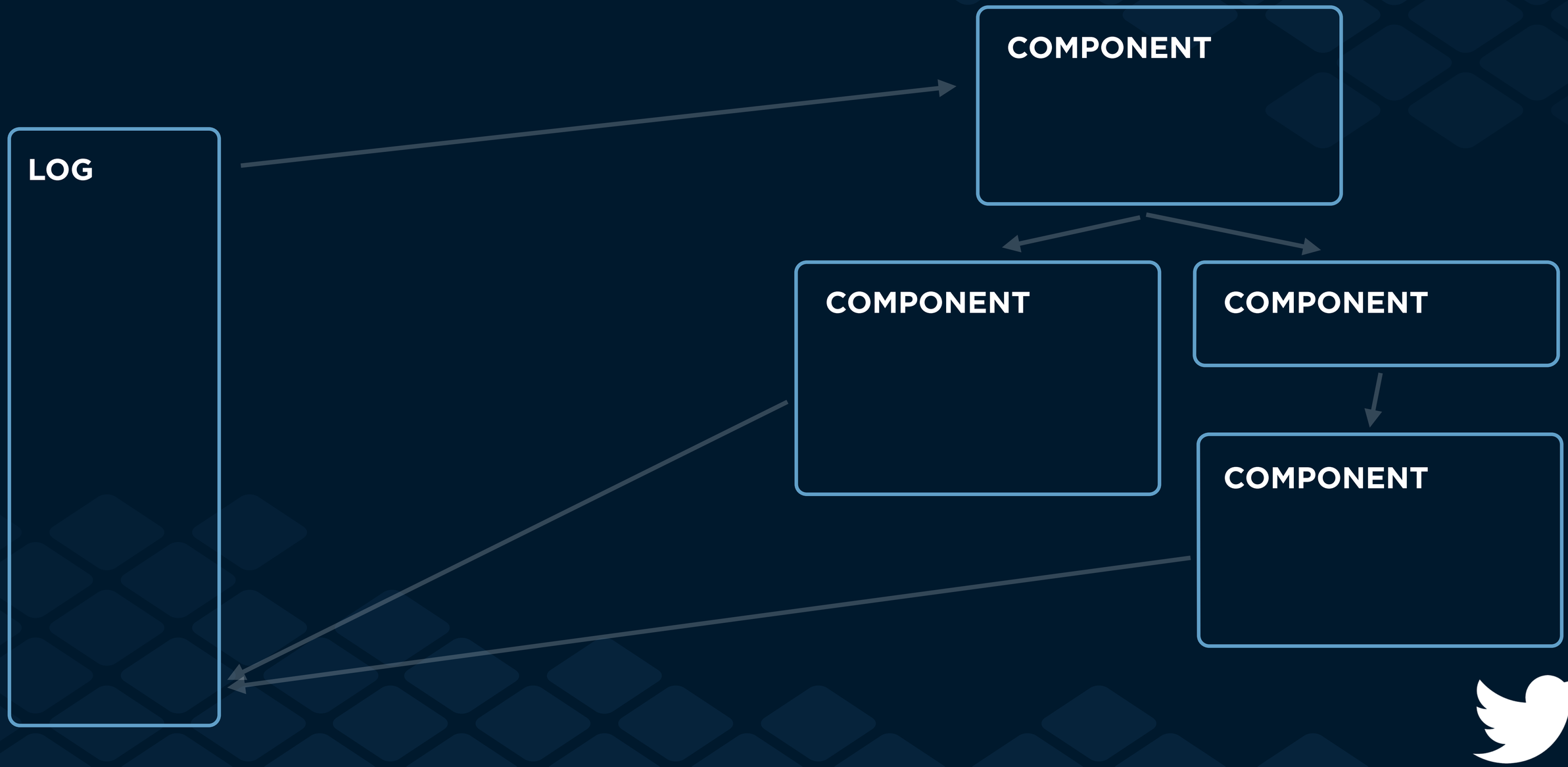
https://speakerdeck.com/jmorrell/jsconf-uy-flux-those-who-forget-the-past-dot-dot-dot-1

https://github.com/gaearon/redux

https://github.com/threepointone/disto



To the whiteboard!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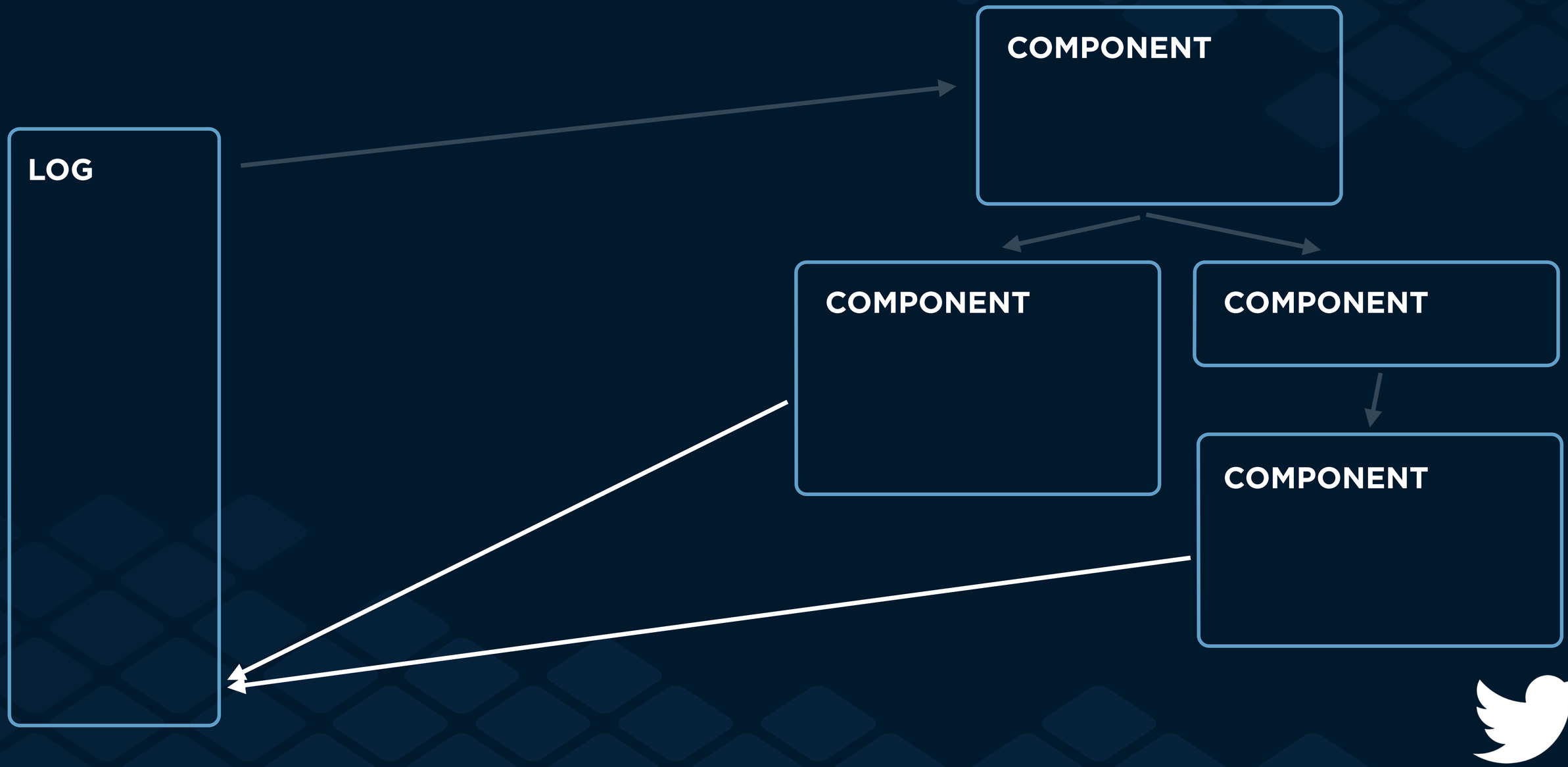
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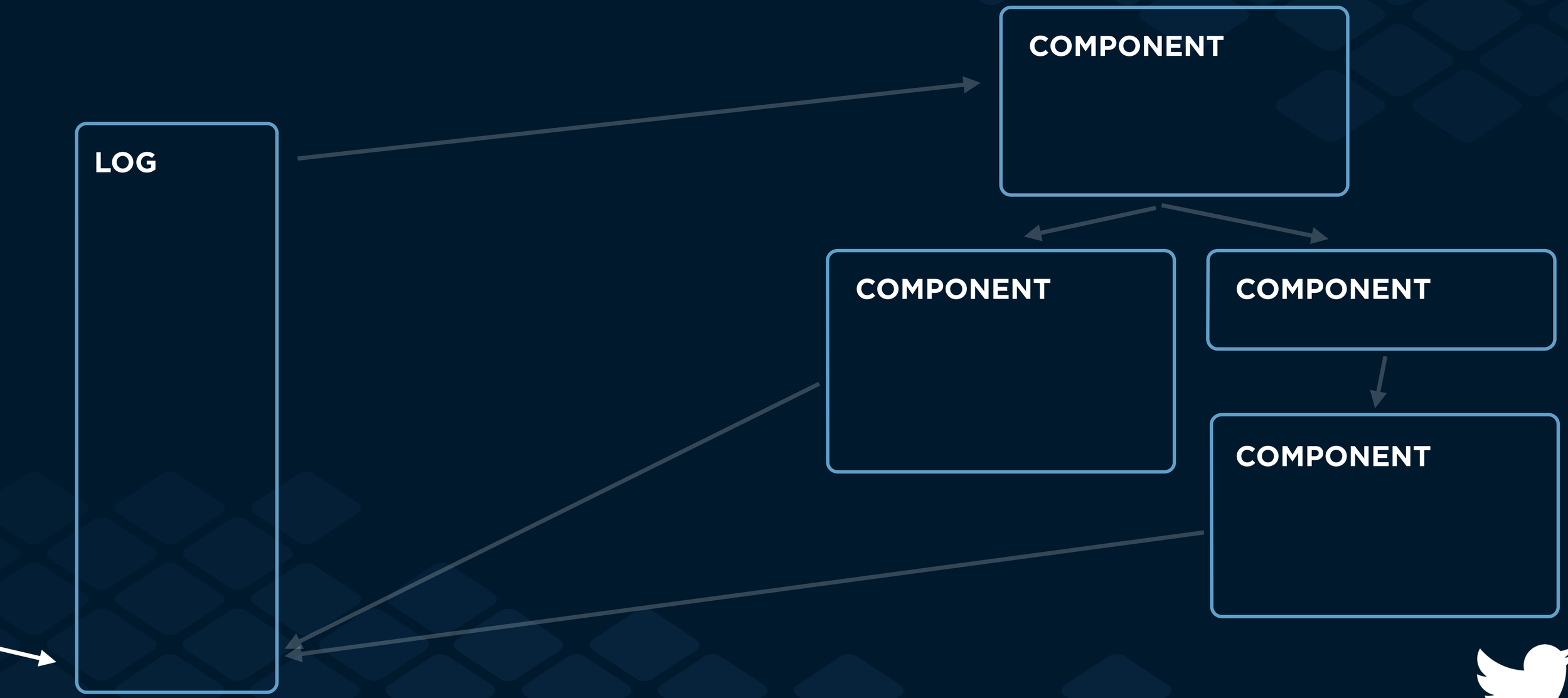
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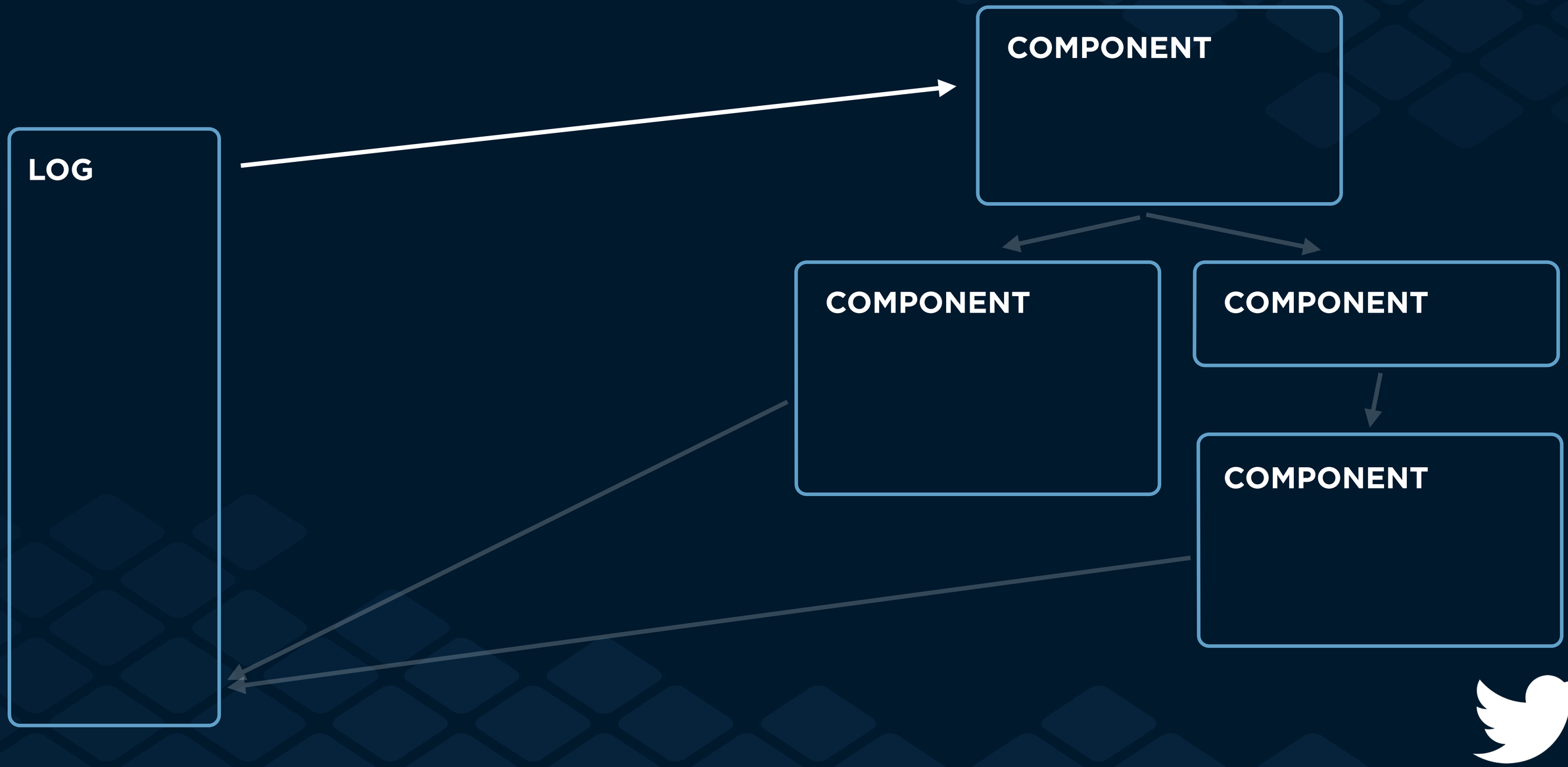
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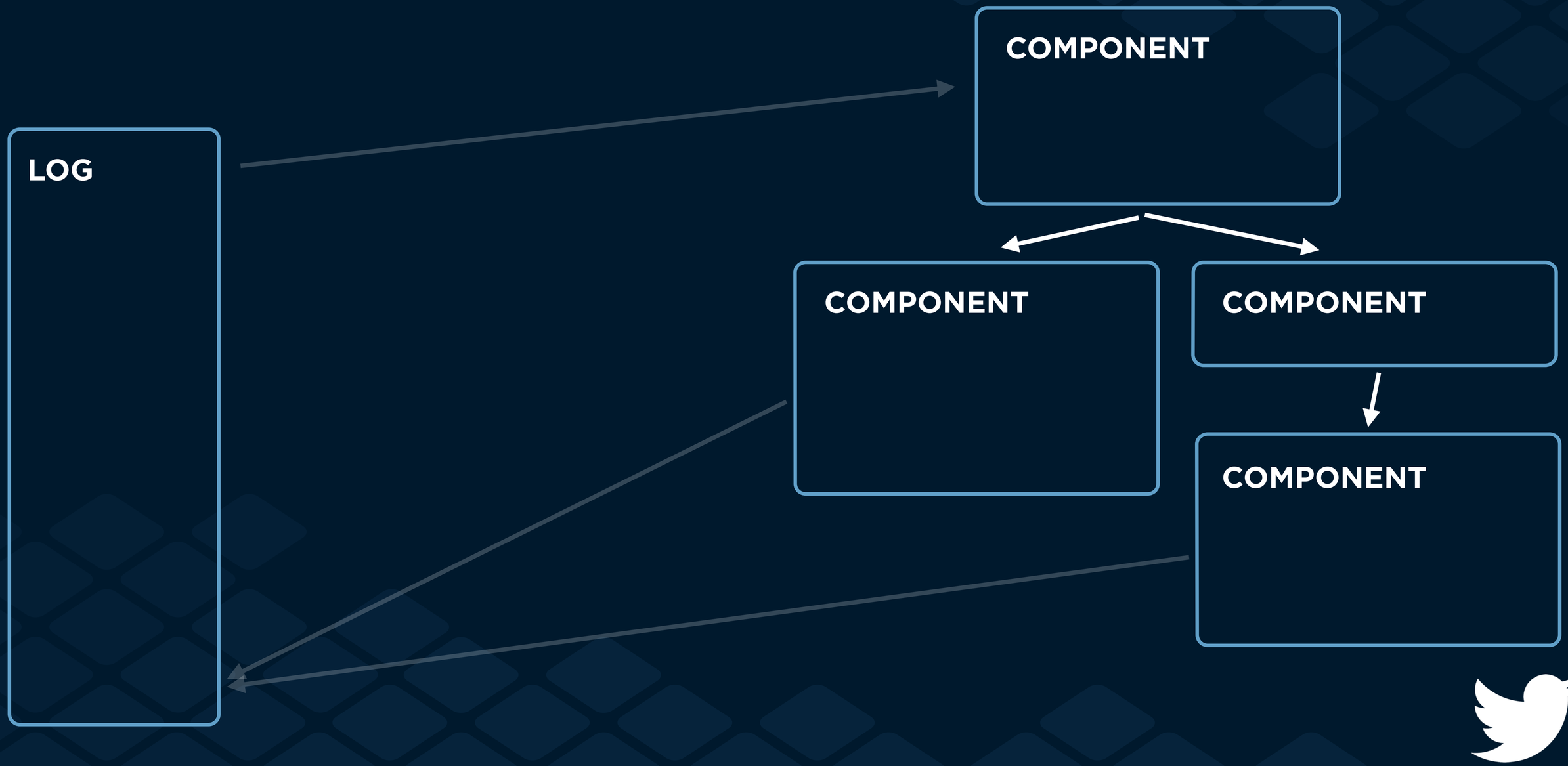
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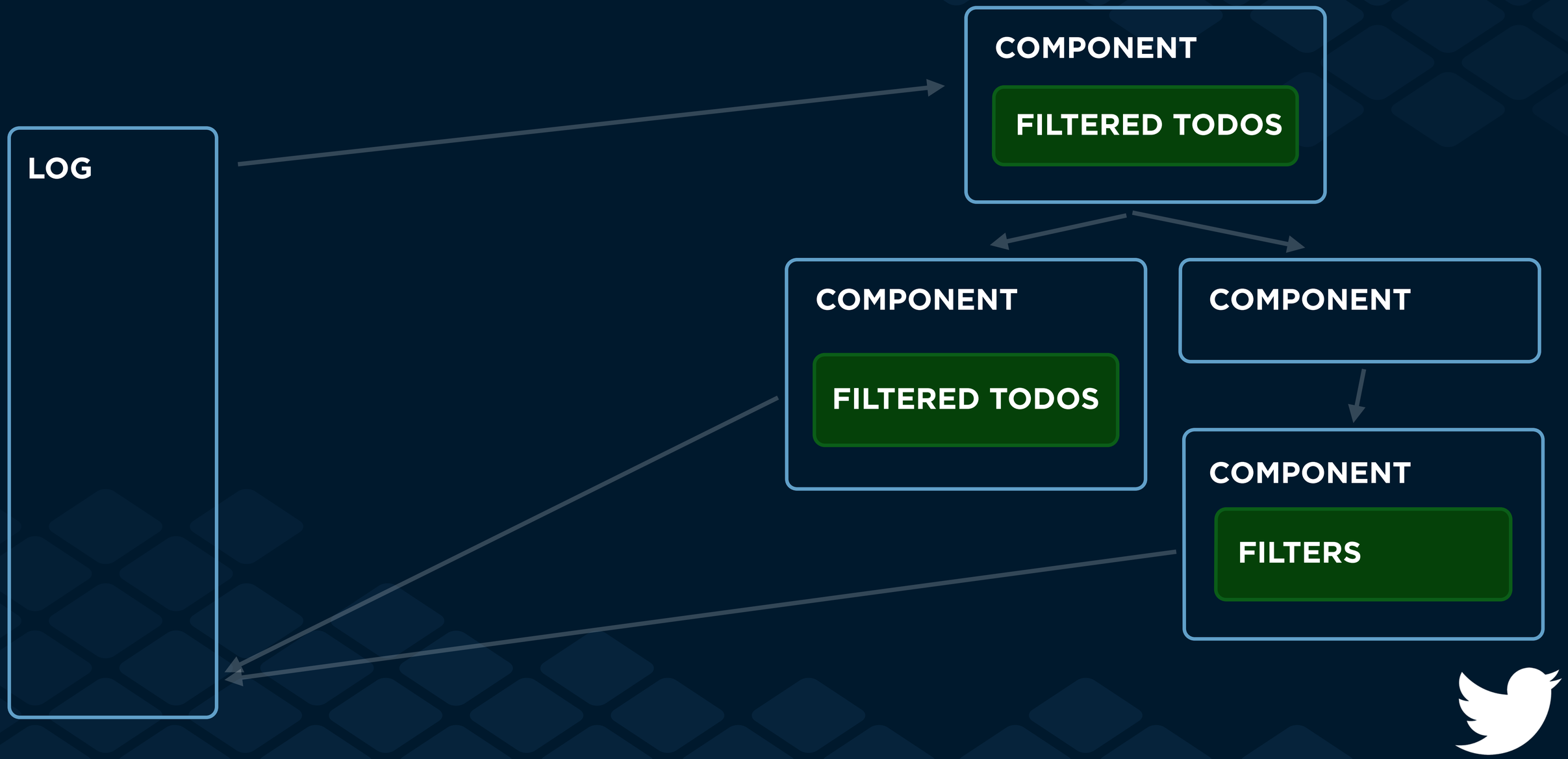
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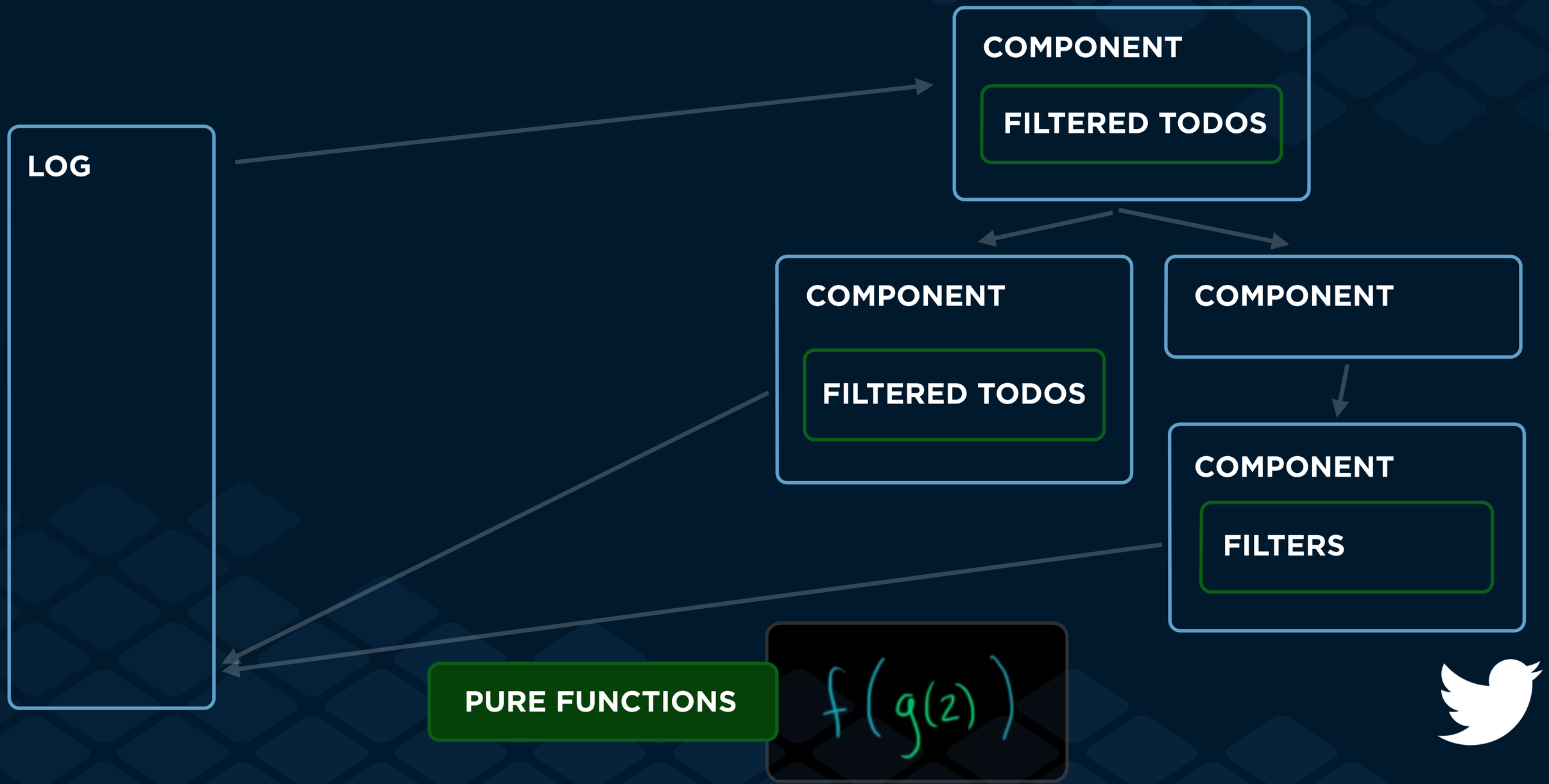
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Challenges

Challenges

Building blocks

Optimizations

Building blocks

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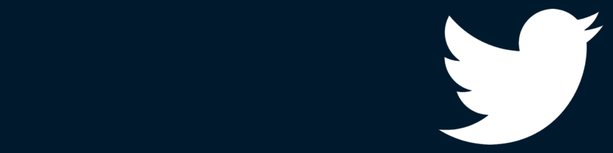
HTTP REQUESTS

USER ACTIONS

REALTIME UPDATES



Building blocks

LOG

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HTTP REQUESTS

USER ACTIONS

REALTIME UPDATES

TODOS

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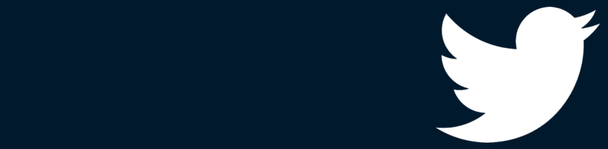

Building blocks

Building blocks

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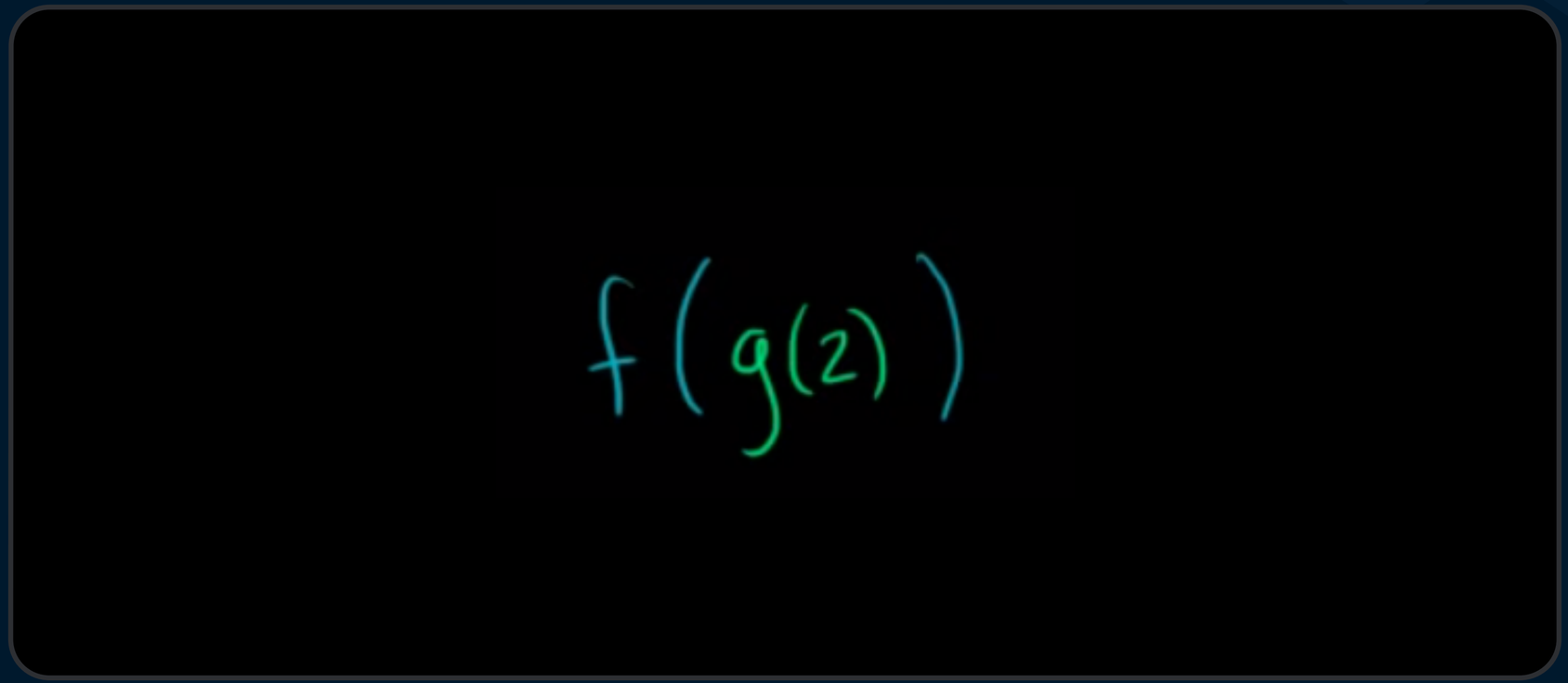
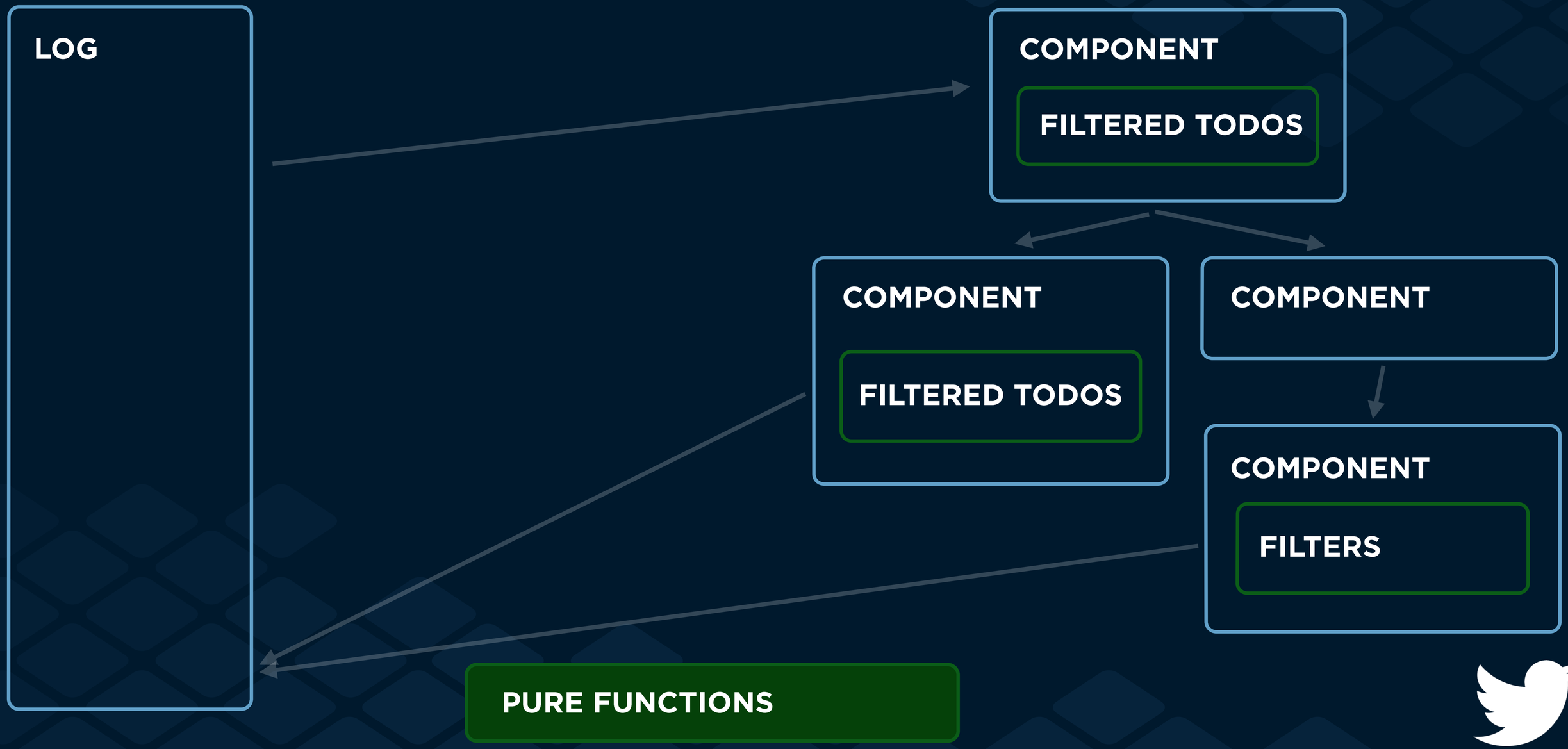


Challenges

Building blocks

Optimizations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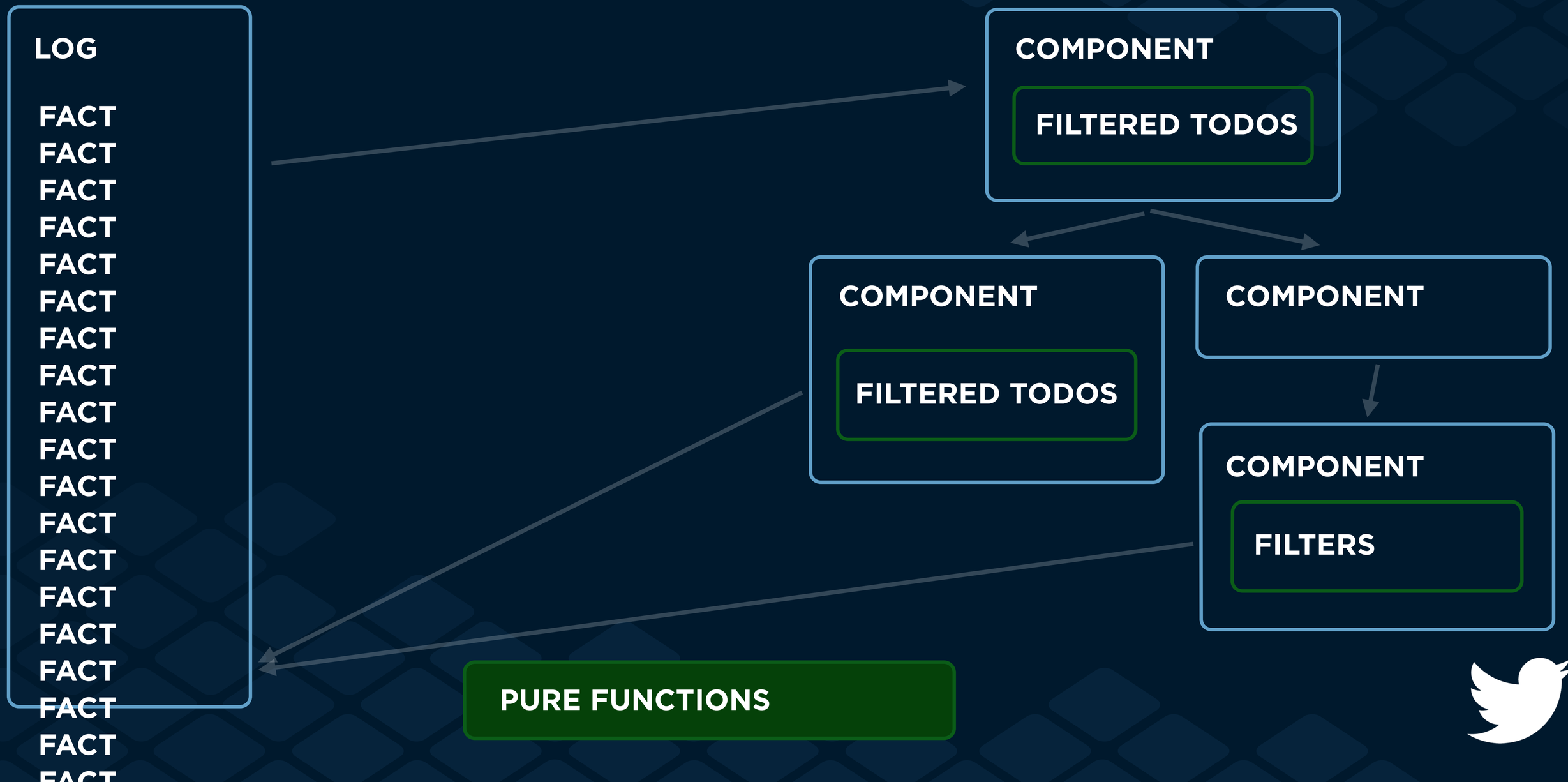
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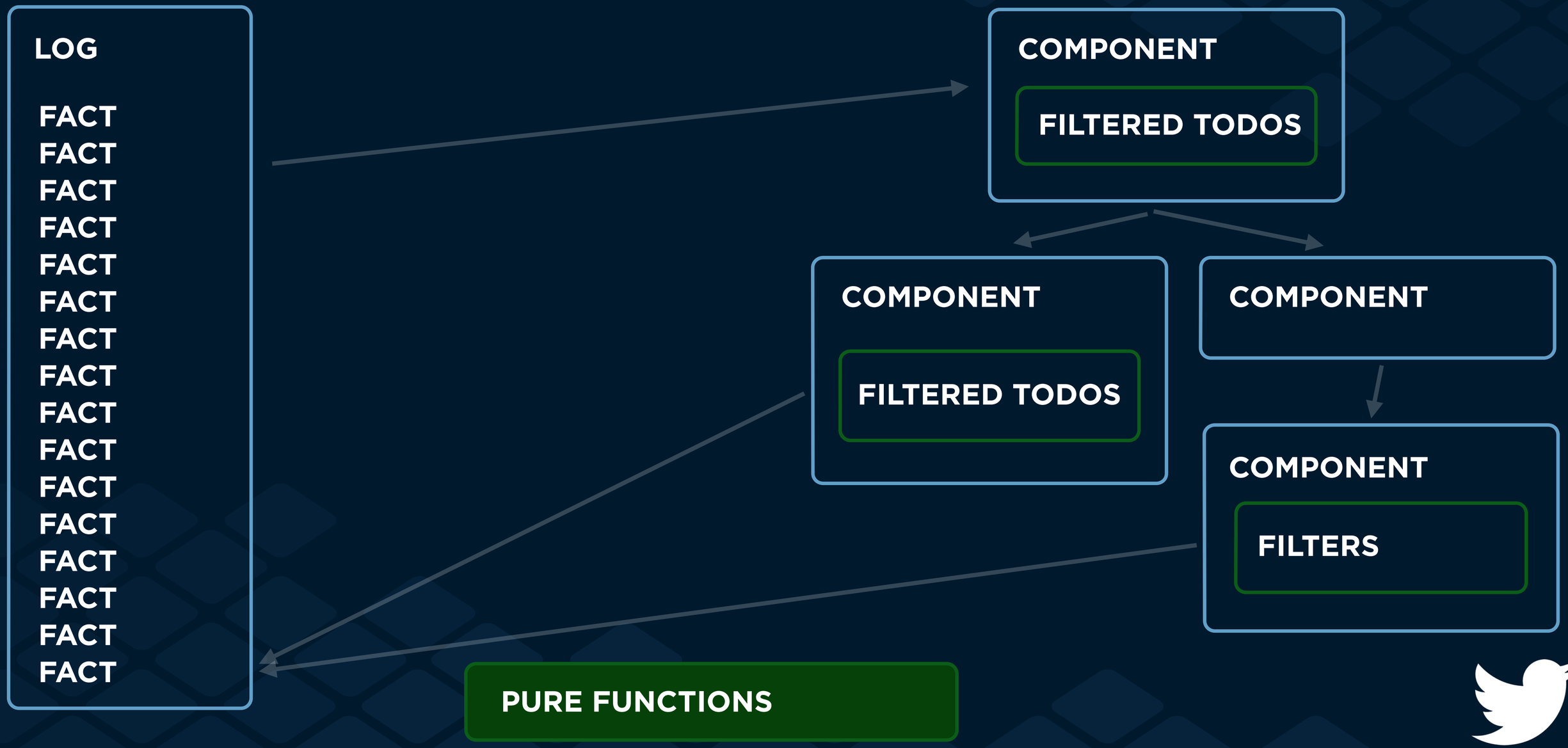
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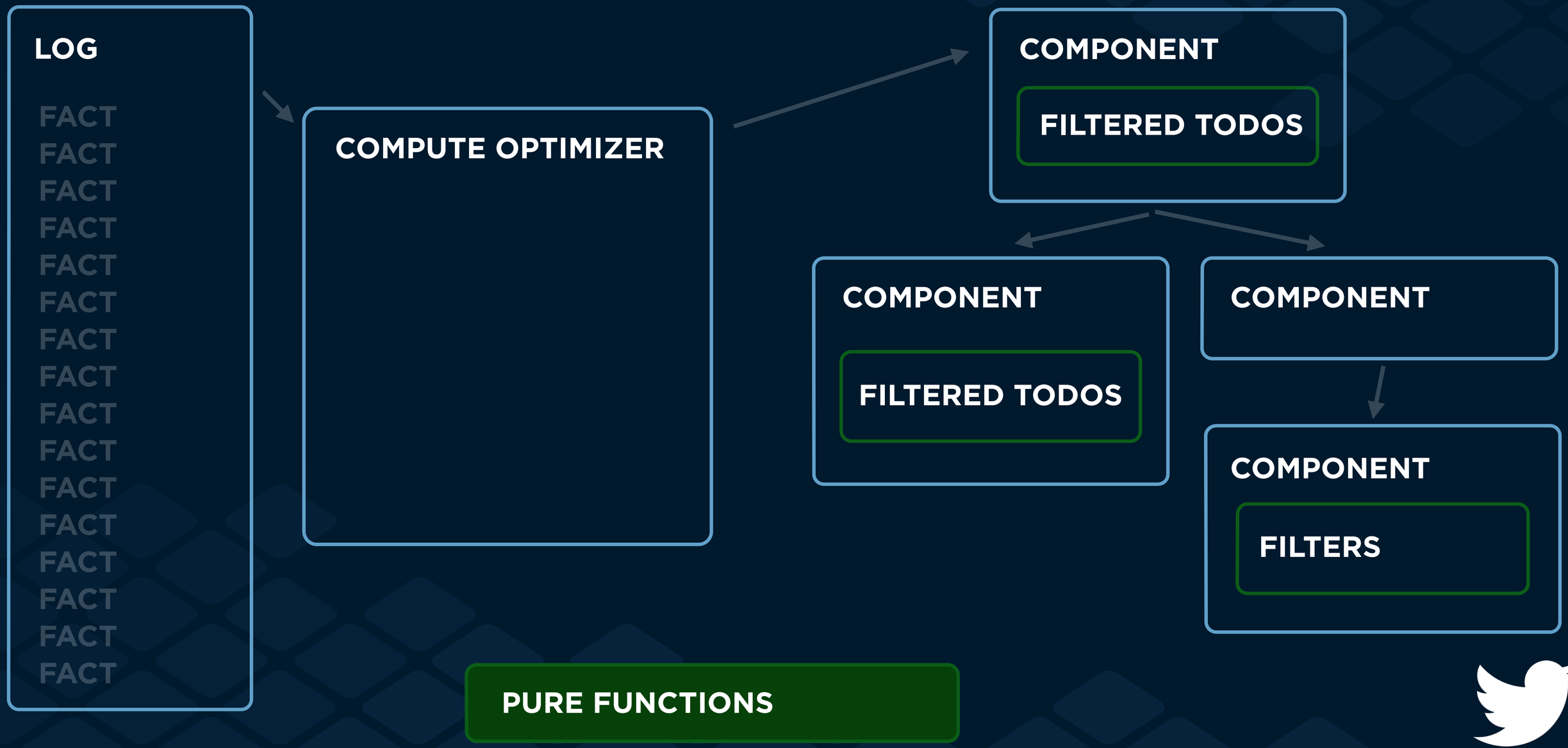
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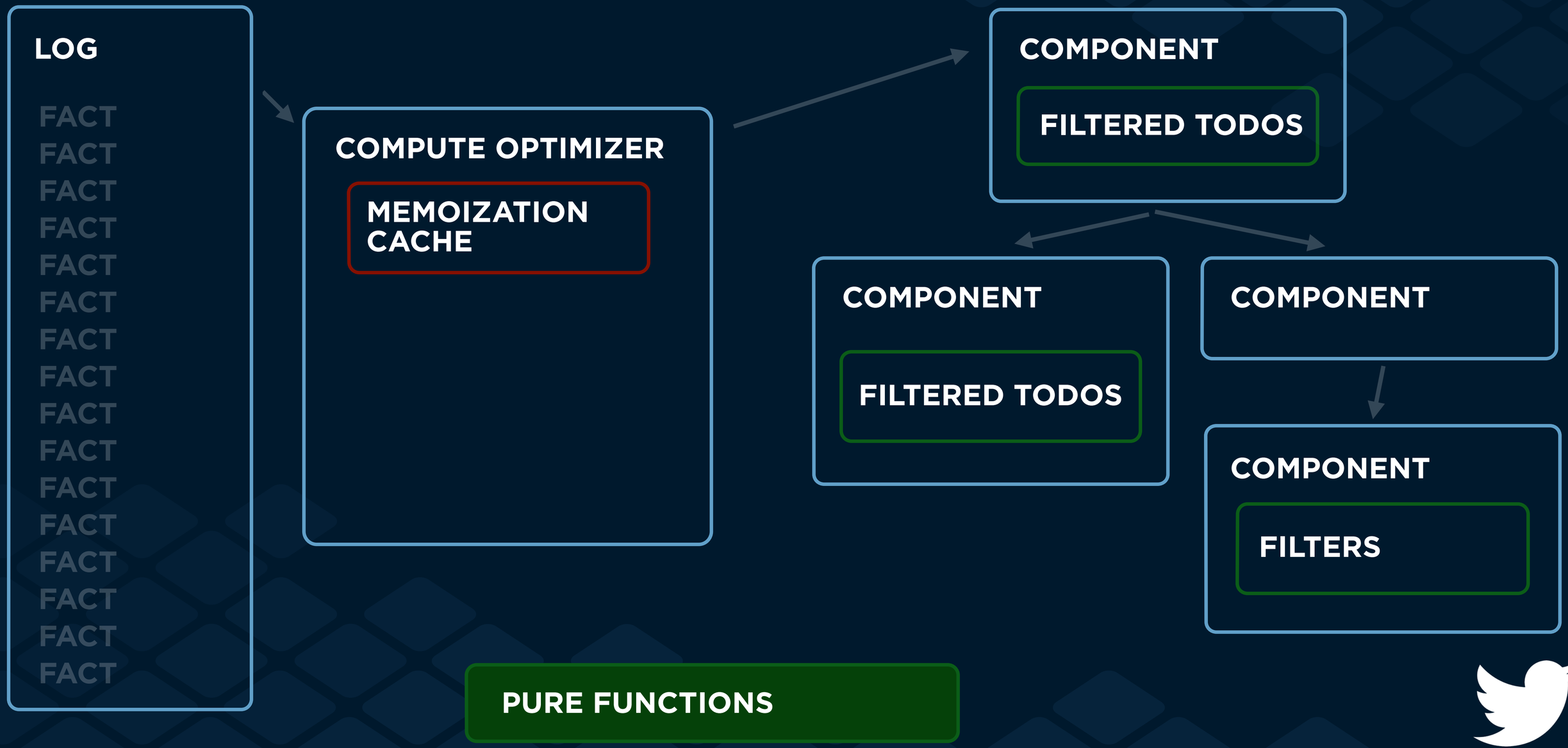
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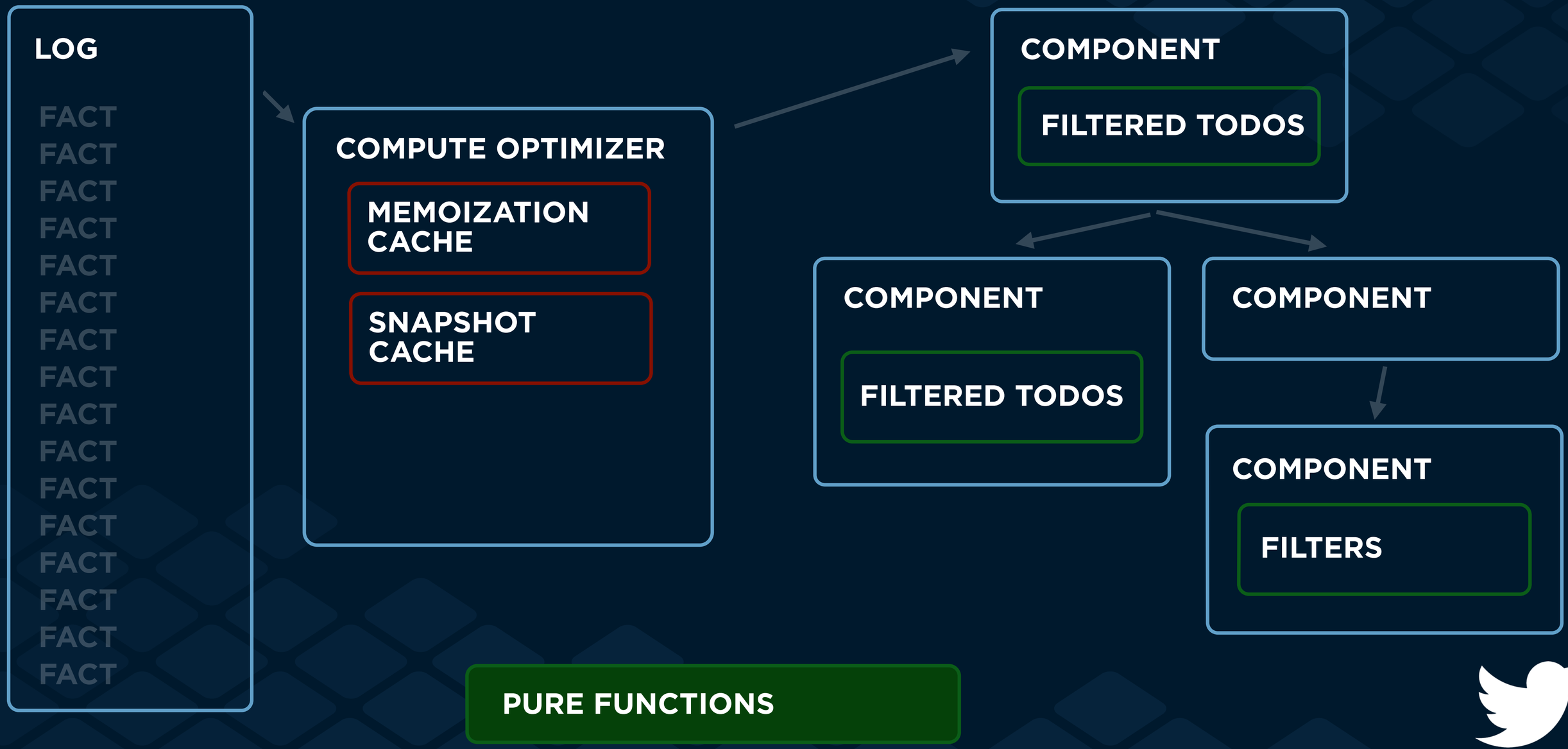
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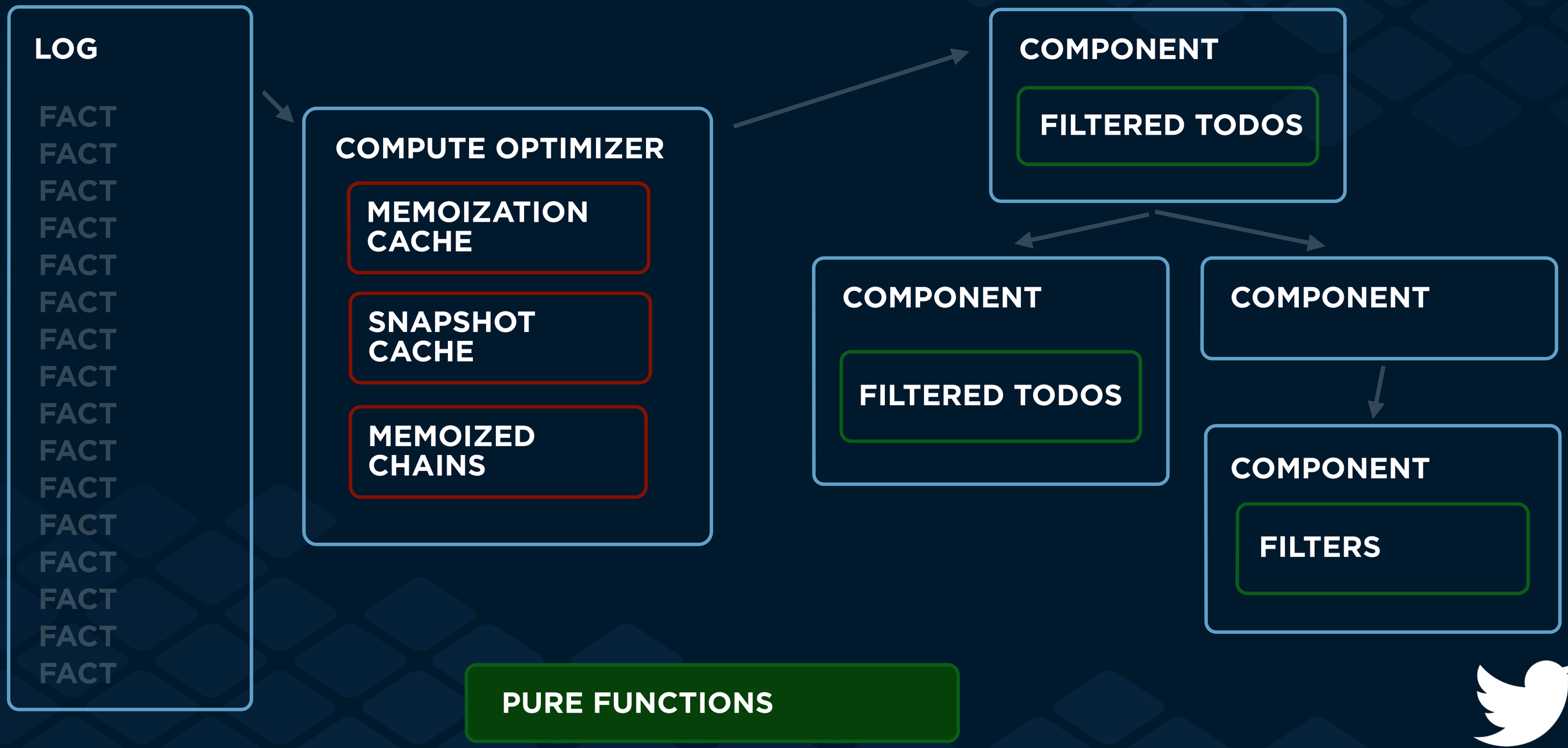
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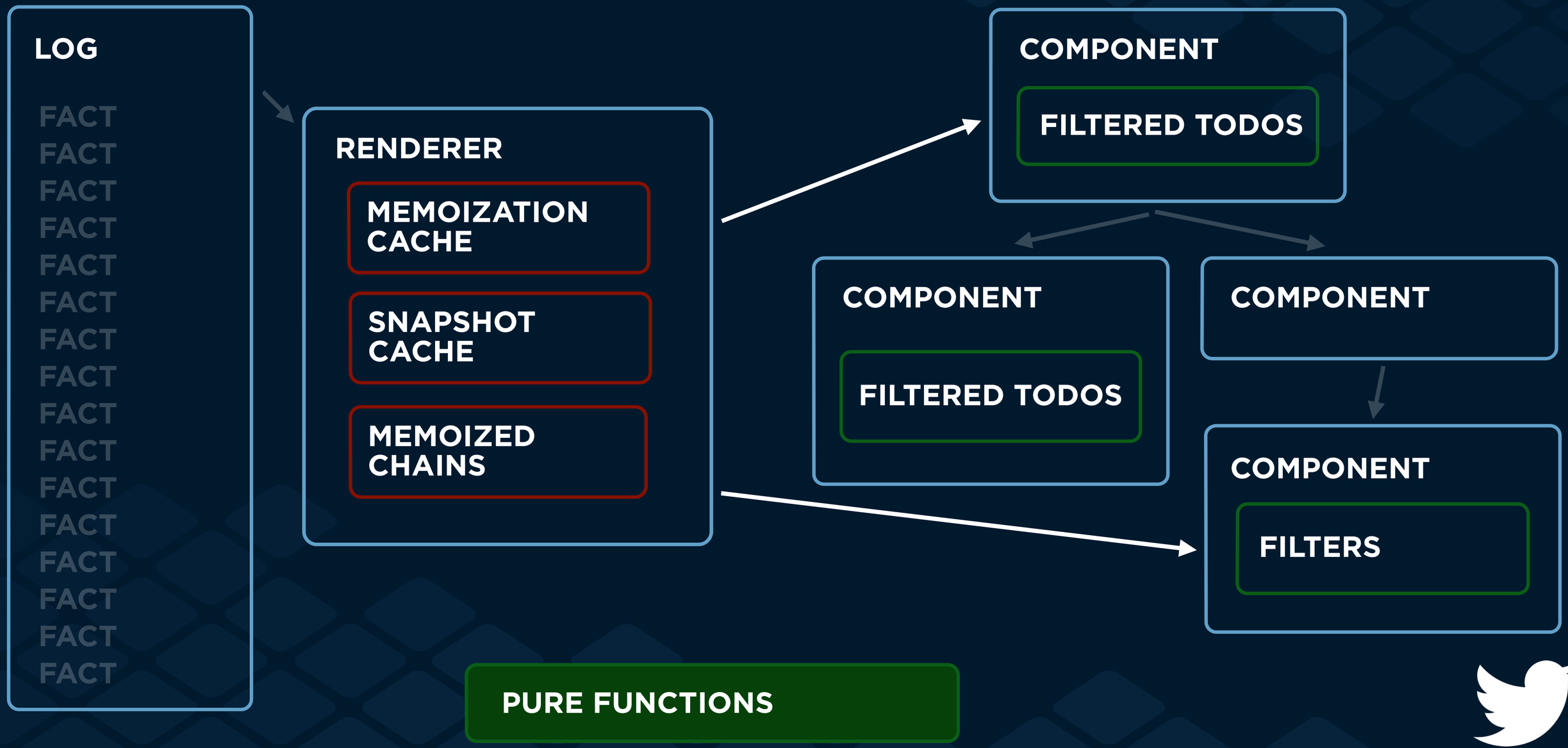
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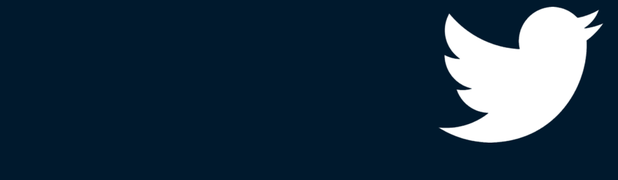
Takeaways

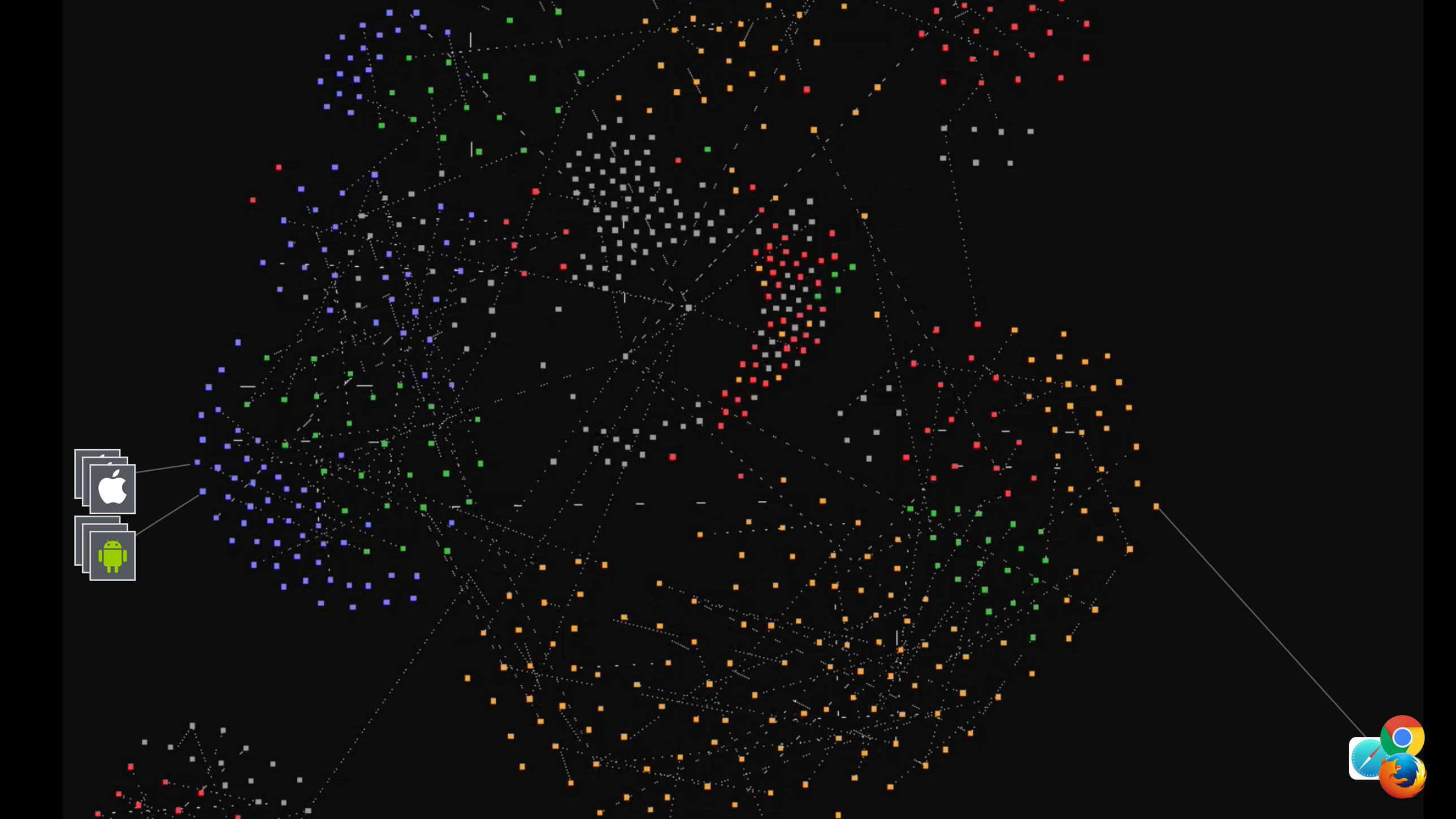
Simplifying

Collaborating across the stack

Push effects out to the edge

Embrace the log





Joseph Savona
@en_JS

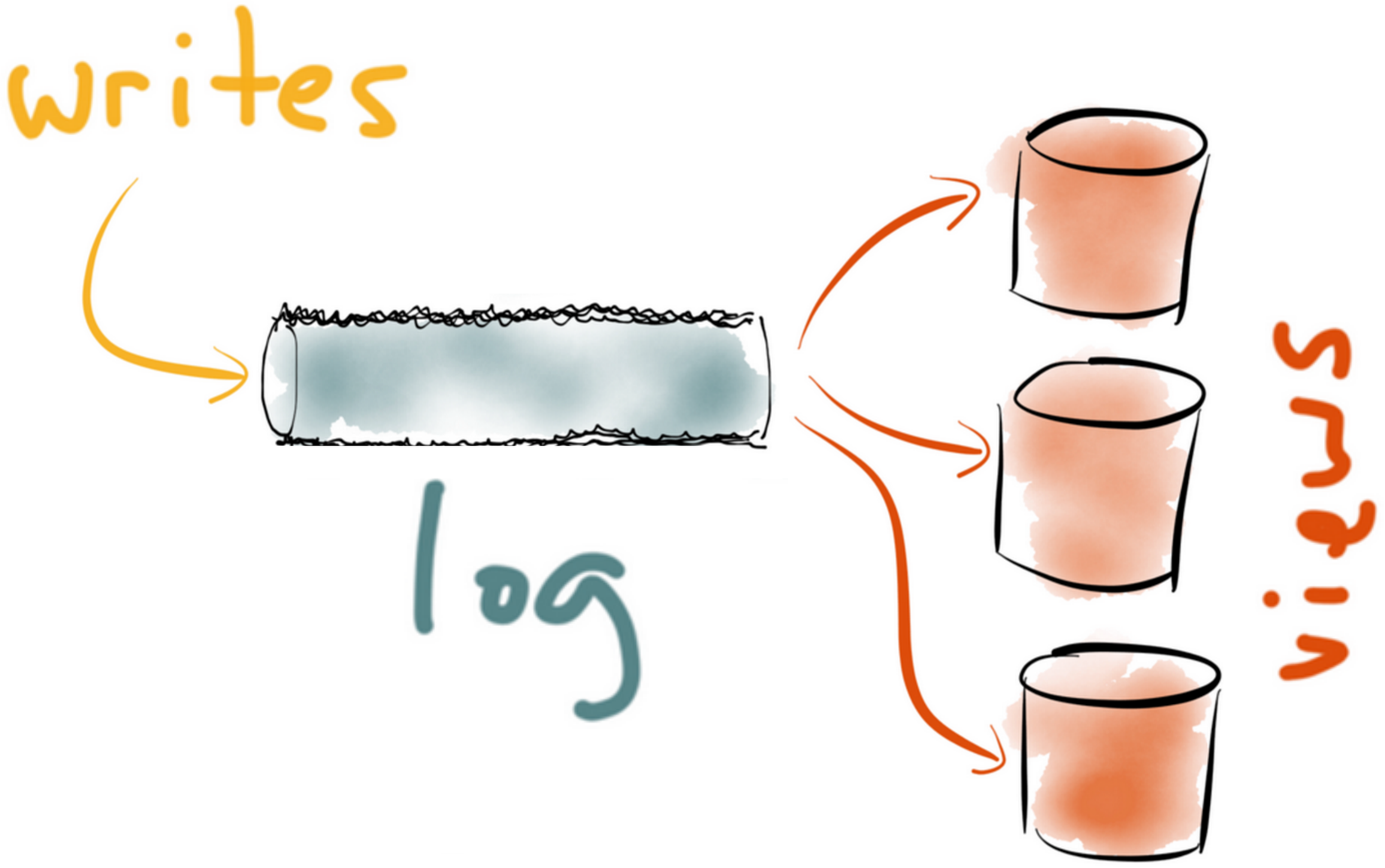
Following

The solution to async UI development is not async APIs: declarative, functional approaches are more powerful and easier to reason about.

RETWEETS 9

FAVORITES 16

4:57 PM - 11 Jun 2015


writes
log
views

Thanks!

@krob