



# Building large web-based systems: 10 Recommendations

Stefan Tilkov | @stilkov | innoQ

We'll take care of it - personally.



# Initial goals



**Simplicity**

**Speed**

**Easy development**

**Maximum productivity**

# Long-term goals



**Stability**

**Scalability**

**Maintainability**

**Decoupling**

# Modularize

UI

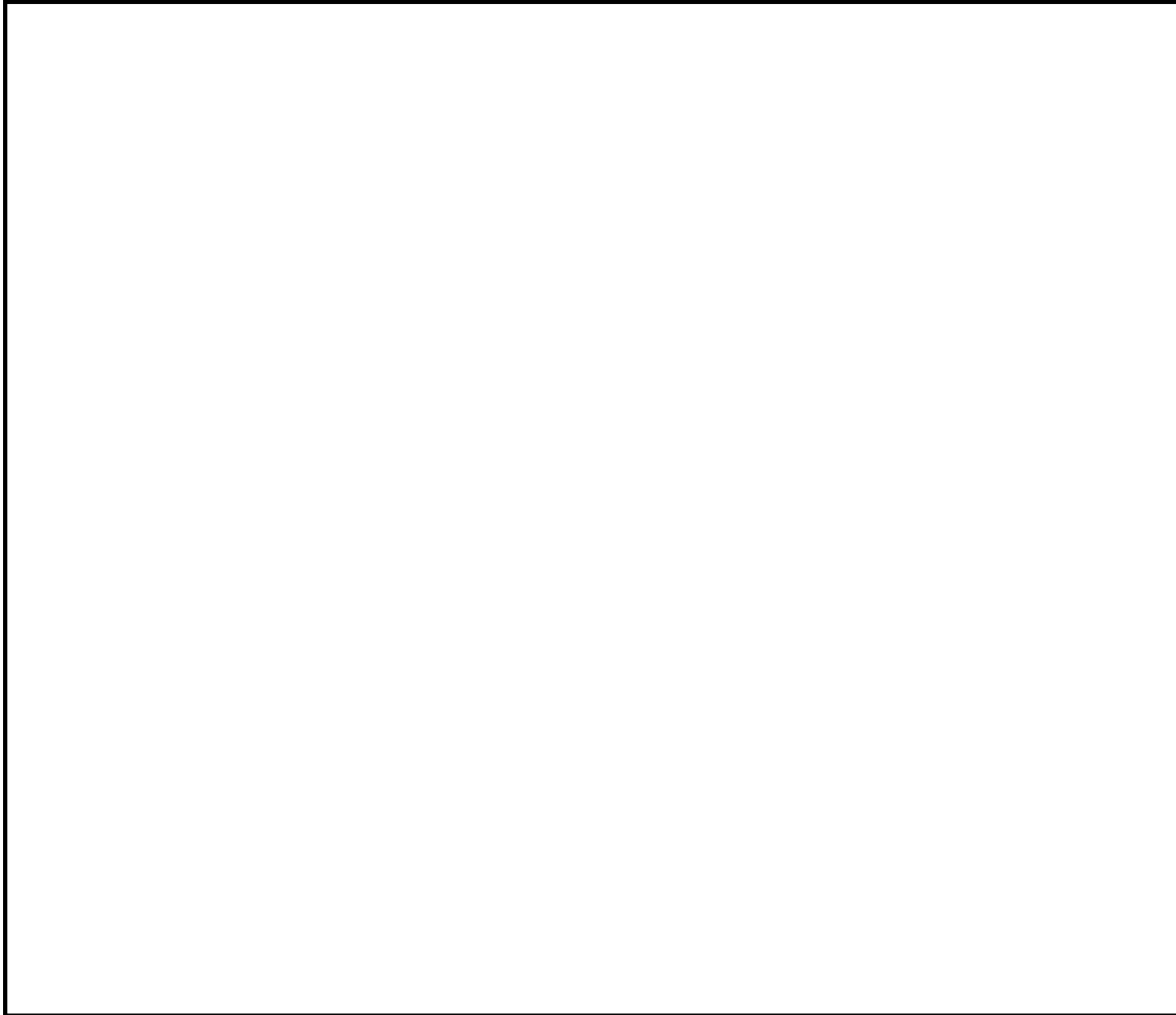
Logic

Data

UI

Logic

Data



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UI

UI

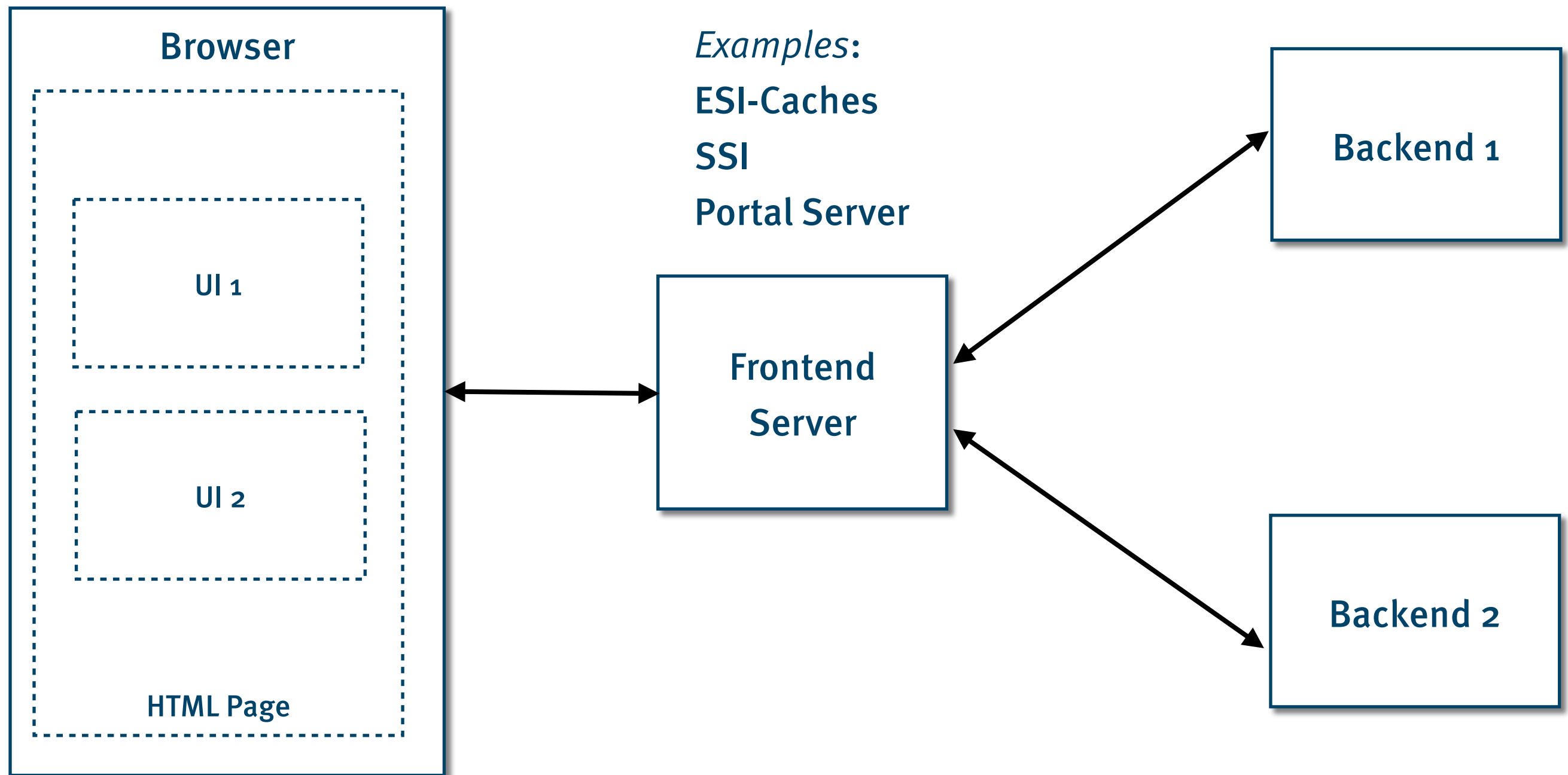
Logic

Logic

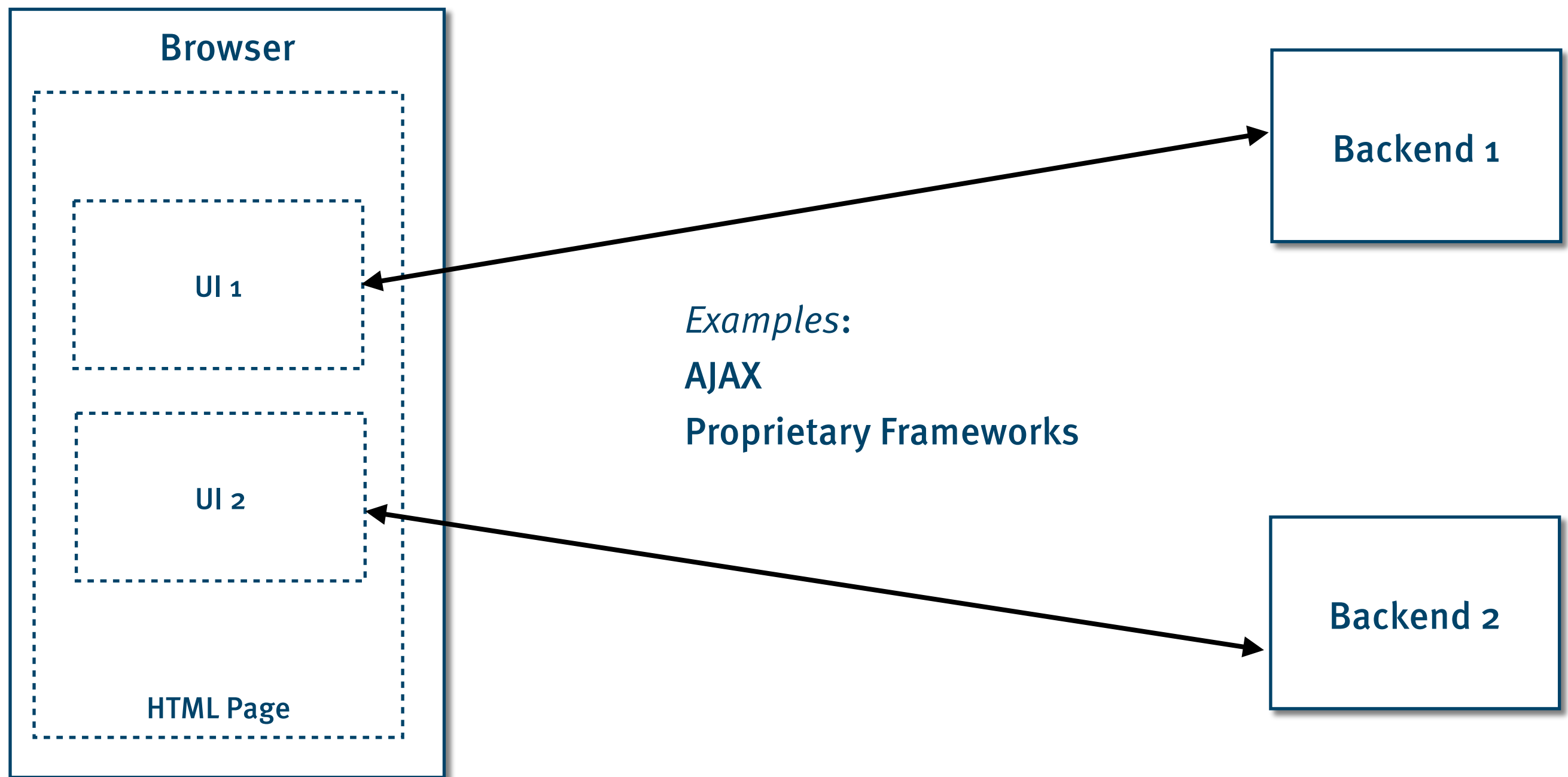
Data

Data

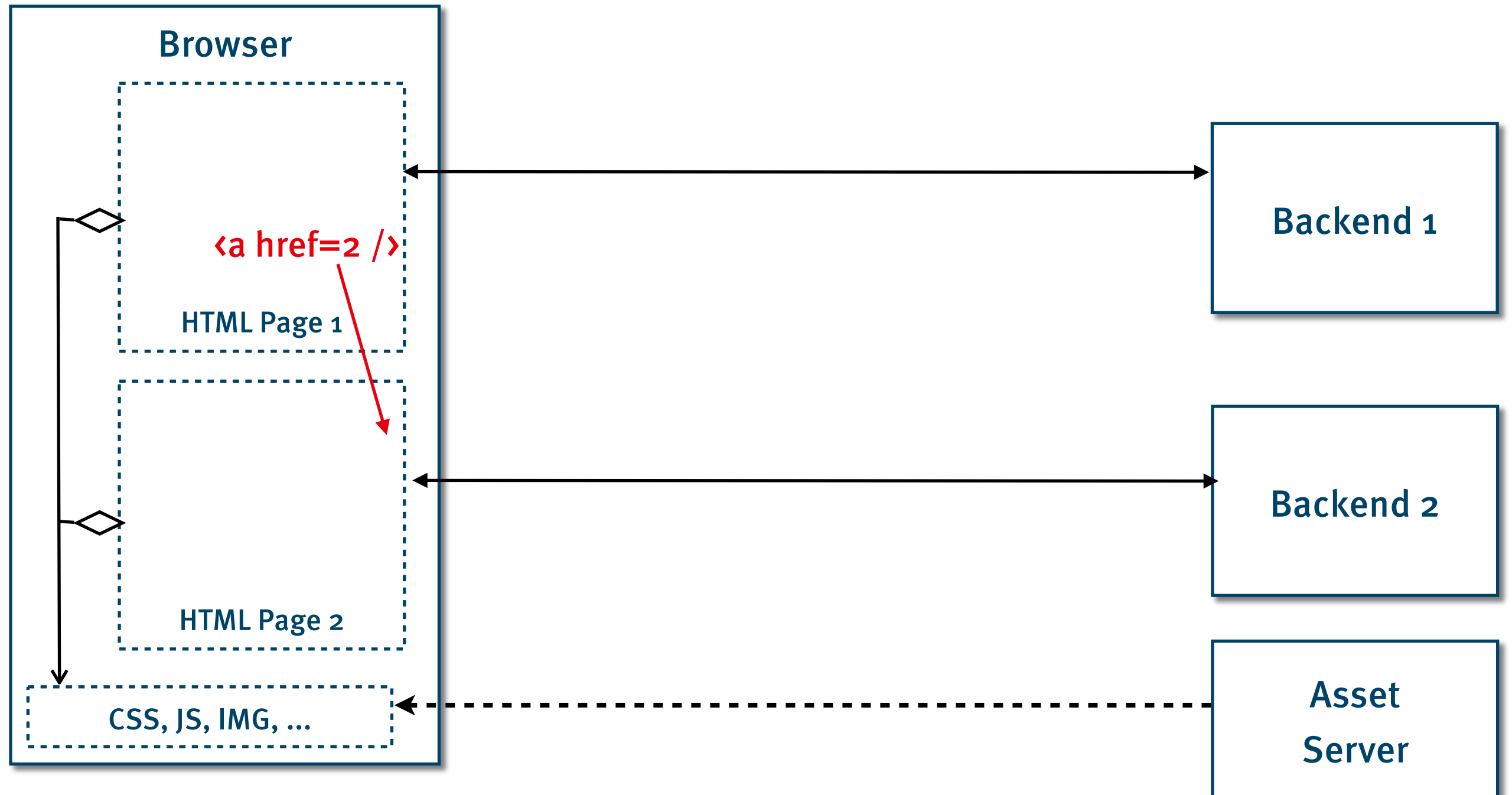
# Server-side integration



# Client-side integration



# Links



## **Recommendation #1:**

***Aim for a web of loosely coupled,  
autonomous systems.***

# Session state

## Browser

Label

Label

Label

Label

Label

Label

Label

Label

Submit

HTML Page

## Server

## Browser

Label

Label

Label

Next

Label

Label

Label

Next

Label

Label

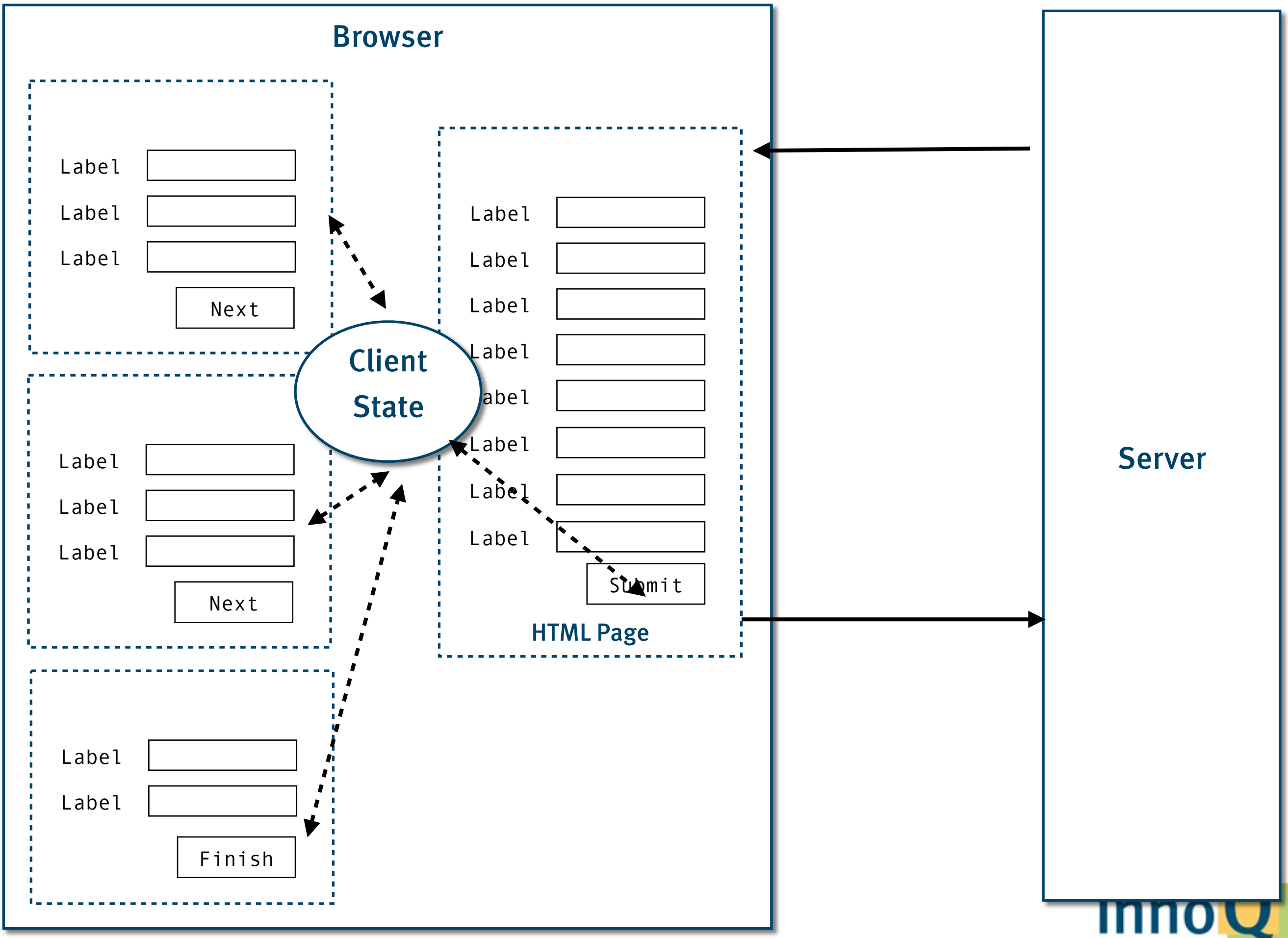
Finish

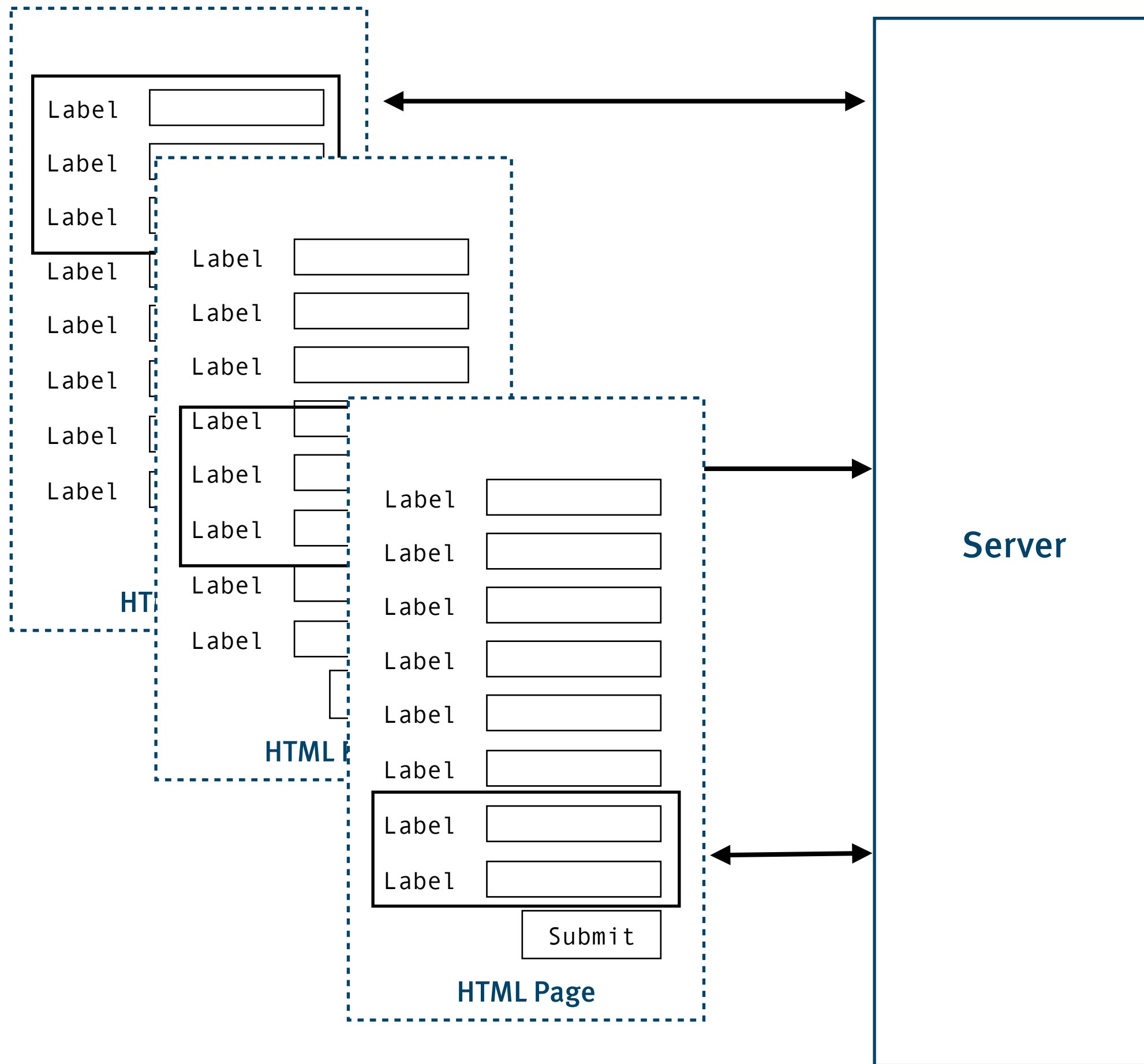
## Server

Session  
State









**Recommendation #2:**  
***Avoid session state wherever possible.***

# Services & APIs

# The Bezos Mandate\*

1. All teams will expose **data and functionality** through **service interfaces**.
2. Teams must communicate with each other through these interfaces.
3. No other form of interprocess communication allowed, **only service calls over the net**.
4. The protocols used are unimportant.
5. All service interfaces to be designed from the ground up to be **externalizable**. No exceptions.
6. Anyone who doesn't do this will be fired.
7. Thank you; have a nice day!

\*Steve Yegge, <https://plus.google.com/112678702228711889851/posts/eVeouesvaVX>



Service with  
RESTful API

Well-designed  
Web app



Well-designed  
Web app  
Service with  
RESTful API

**Recommendation #3:**  
***Eat your own API dog food.***



# Identity

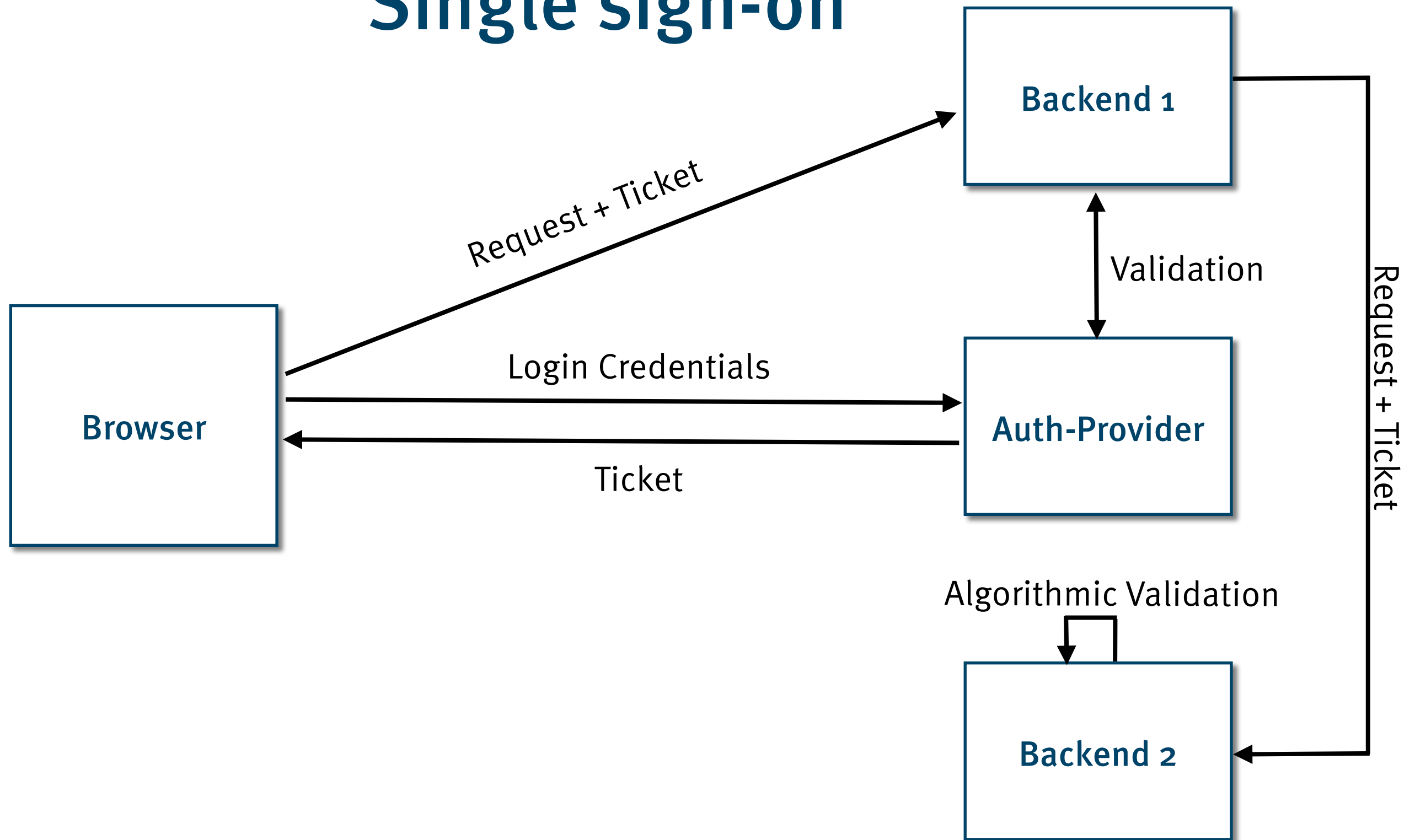
# Users

# Products

# Identity Users

# Products

# Single sign-on



## **Recommendation #4:**

***Separate user identity, sign-up and self-care from product dependencies.***

# Understand your requests





WIRTSCHAFT.  
WACHSTUM.  
WOHLSTAND.

[Ministerium](#) | [Presse](#) | [Medienraum](#)[Suche](#)[Kontakt](#)[Service](#)[Inhalt](#)[RSS](#)[EN](#)[FR](#)[Finden](#)

## Neues wagen, Wachstum stärken

Ohne neue Technologien und Innovationen  
kein Wachstum und Wohlstand in Deutschland. Mit dem

**JA ZU NEUEN TECHNOLOGIEN.**  
**DAMIT WIR MORGEN NICHT VON GESTERN SIND.**



Console HTML CSS Script DOM Net YSlow

Clear Persist All HTML CSS JS XHR Images Flash Media

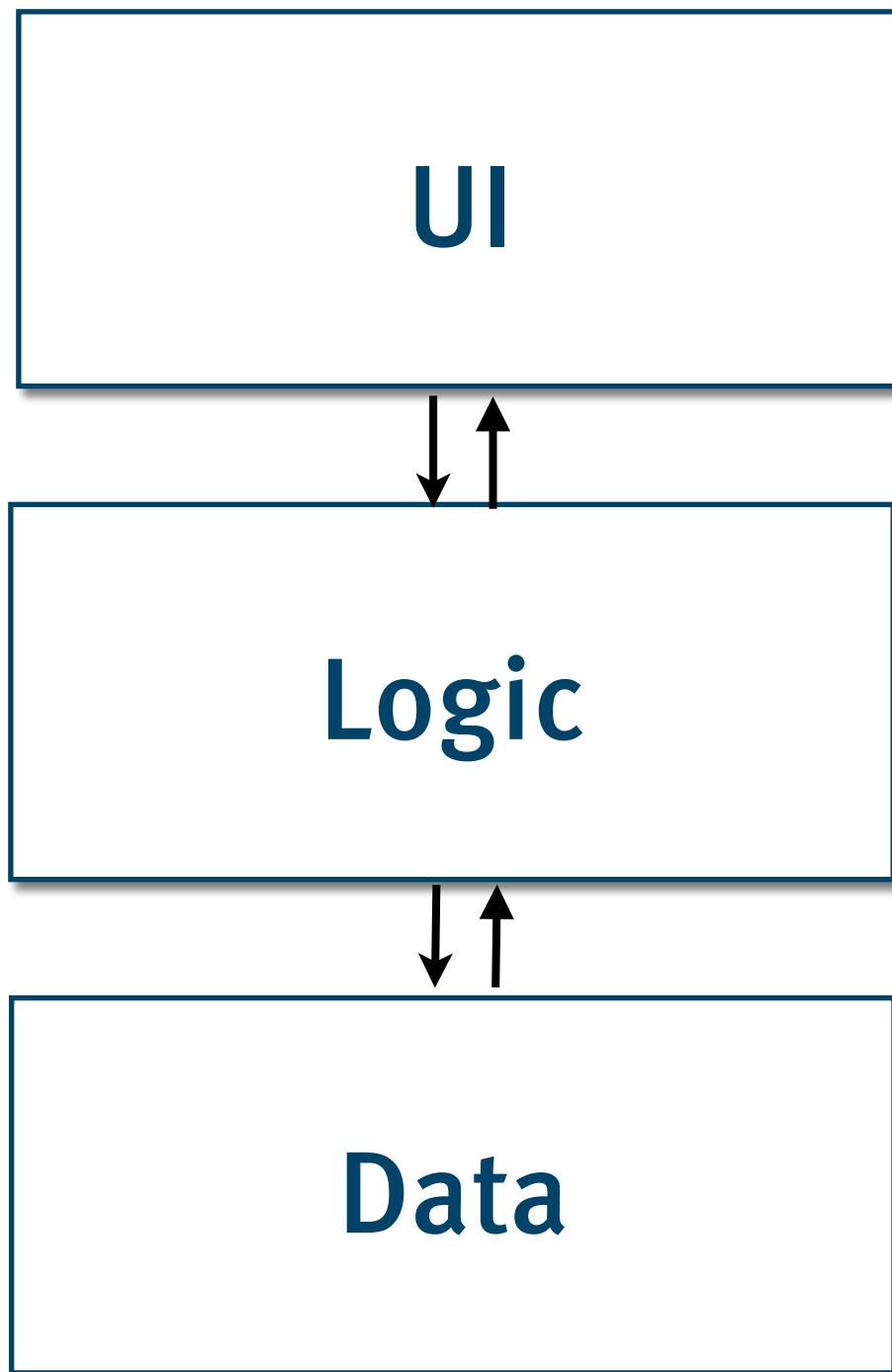
URL	Status	Domain	Size	Timeline
▶ GET bmwi.de	200 OK	bmwi.de	83.1 KB	637ms
▶ GET styles.css	304 Not Modified	bmwi.de	30.6 KB	87ms
▶ GET ajax_tooltip.js	304 Not Modified	bmwi.de	5.7 KB	86ms
▶ GET jquery-1.3.1.min.js	304 Not Modified	bmwi.de	54 KB	86ms
▶ GET jquery-ui-1.8.15.cu	304 Not Modified	bmwi.de	33.6 KB	106ms
▶ GET jquery.scrollTo-mir	304 Not Modified	bmwi.de	1.9 KB	92ms
▶ GET jquery.tools.min.js	304 Not Modified	bmwi.de	31.3 KB	104ms
▶ GET jquery.treeview.pac	304 Not Modified	bmwi.de	8.1 KB	131ms
▶ GET jquery.carousel.min	304 Not Modified	bmwi.de	8.8 KB	139ms
▶ GET jquery.cookie.pack.j	304 Not Modified	bmwi.de	1019 B	160ms
▶ GET swfobject.js	304 Not Modified	bmwi.de	9.5 KB	177ms
▶ GET bmwiHomepage.js	304 Not Modified	bmwi.de	14 KB	180ms
▶ GET bmwiUsage.js	304 Not Modified	bmwi.de	11.3 KB	184ms
▶ GET bmwiFlash.js	304 Not Modified	bmwi.de	1.6 KB	198ms
▶ GET rwmp?document_ui	302 Found	trackerstatistik.init-ag.de	400 B	113ms
▶ GET bg_body.png	304 Not Modified	bmwi.de	610 B	81ms
▶ GET logoBMWDe2,prop	200 OK	bmwi.de	6.5 KB	90ms
▶ GET bg_main.png	304 Not Modified	bmwi.de	38.5 KB	78ms



**Recommendation #5:**  
***Pick the low-hanging fruit of  
front-end performance optimizations.***

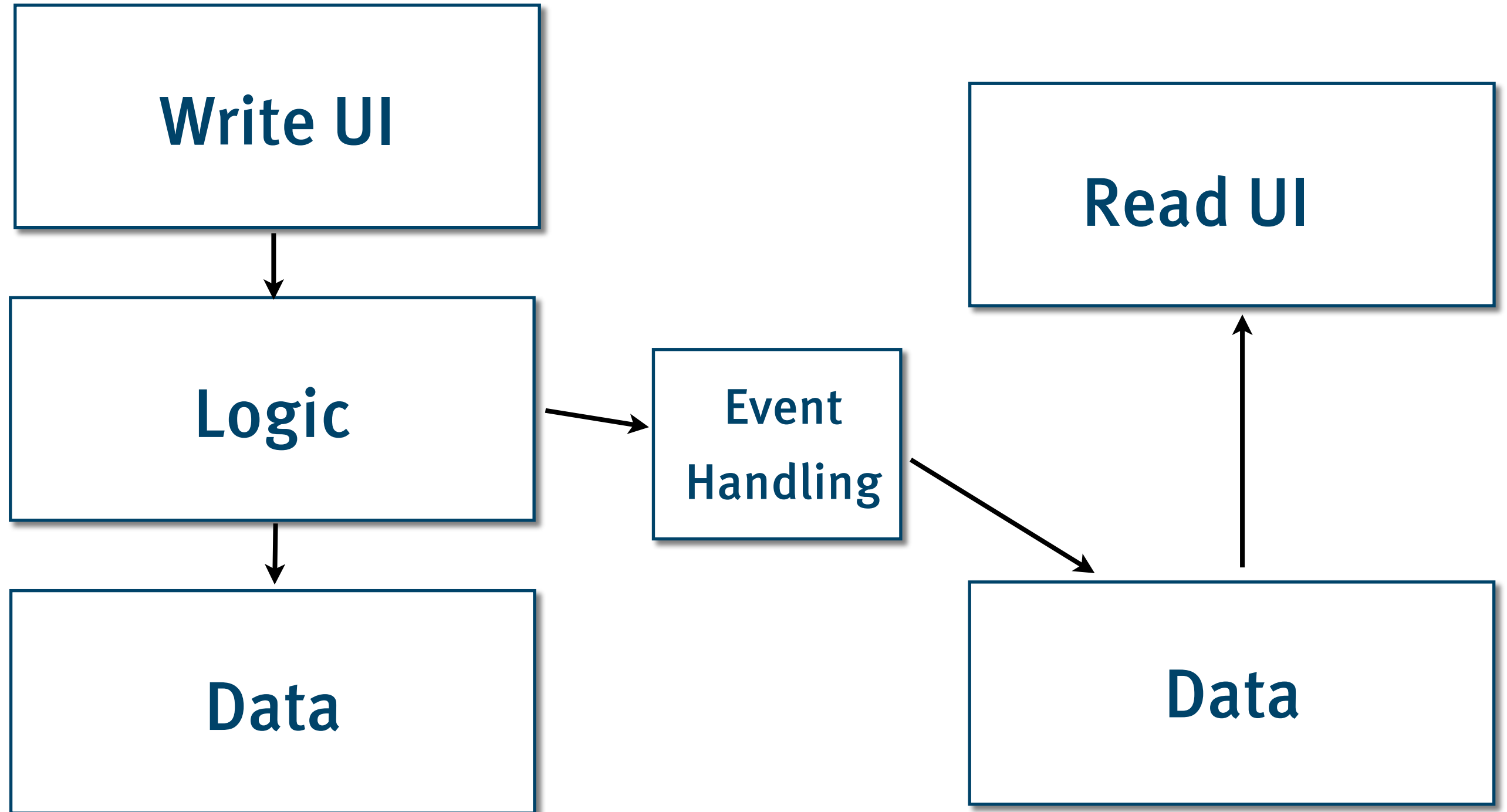


# Separate Command & Query Paths



# CQRS

(Command Query Responsibility Segregation)



**Recommendation #6:**  
***Don't bother readers  
with write complexity.***

# Web-centric Web UIs

<b>Server-side components</b>	<p>Avoid HTML, JS, CSS</p> <p>Trade Familiarity for Complexity</p> <p>Session-centric</p>
<b>ROCA</b>	<p><b>Server-side POSH</b></p> <p><b>Client-side components</b></p> <p><b>Web-centric</b></p>
<b>Single Page Apps</b>	<p><b>Advanced Client Frameworks</b></p> <p><b>Server-side REST APIs</b></p>

# ROCA

<http://roca-style.org/>

# Make your HTML semantic



**Minimal load times**

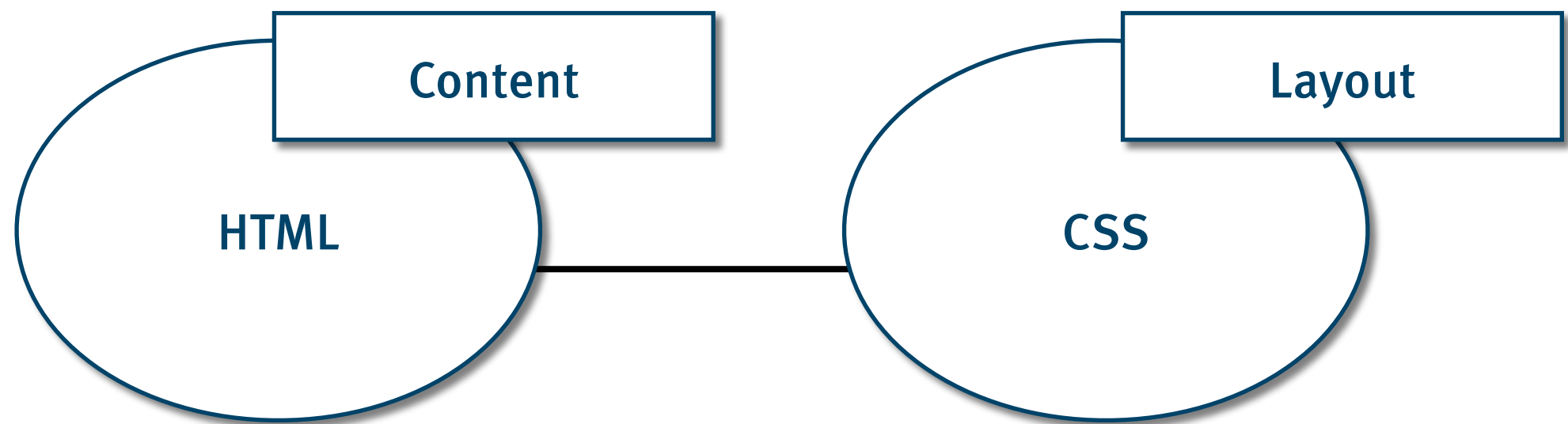
**API usage**

**Accessibility**

**Self-descriptiveness**

**Readability**

**Reusability**



# Use Javascript *unobtrusively*

```
<a href="javascript:doSomething();">  
    Some Link  
</a>
```

```
<a href="#"  
  onclick="doSomething();">  
  Some Link  
</a>
```

```
<a href="/some-resource"  
  onclick="doSomething(this.href);">  
  Some Link  
</a>
```

```
<a href="/some-resource"  
  class="whatever">  
  Some Link  
</a>
```

```
<a href="/some-resource"  
  class="whatever">  
  Some Link  
</a>
```

+

```
$("a.whatever").click(function() {  
  doSomething(this.href);  
});
```



```
<div id="tabs">
  <ul>
    <li><a href="#tabs-1">Nunc tincidunt</a></li>
    <li><a href="#tabs-2">Proin dolor</a></li>
    <li><a href="#tabs-3">Aenean lacinia</a></li>
  </ul>
  <div id="tabs-1">
    <p>Proin elit arcu, rutrum commodo, vehicula ...</p>
  </div>
  <div id="tabs-2">
    <p>Morbi tincidunt, dui sit amet facilisis feugiat, odio ...</p>
  </div>
  <div id="tabs-3">
    <p>Mauris eleifend est et turpis. Duis id erat ...</p>
  </div>
```

+

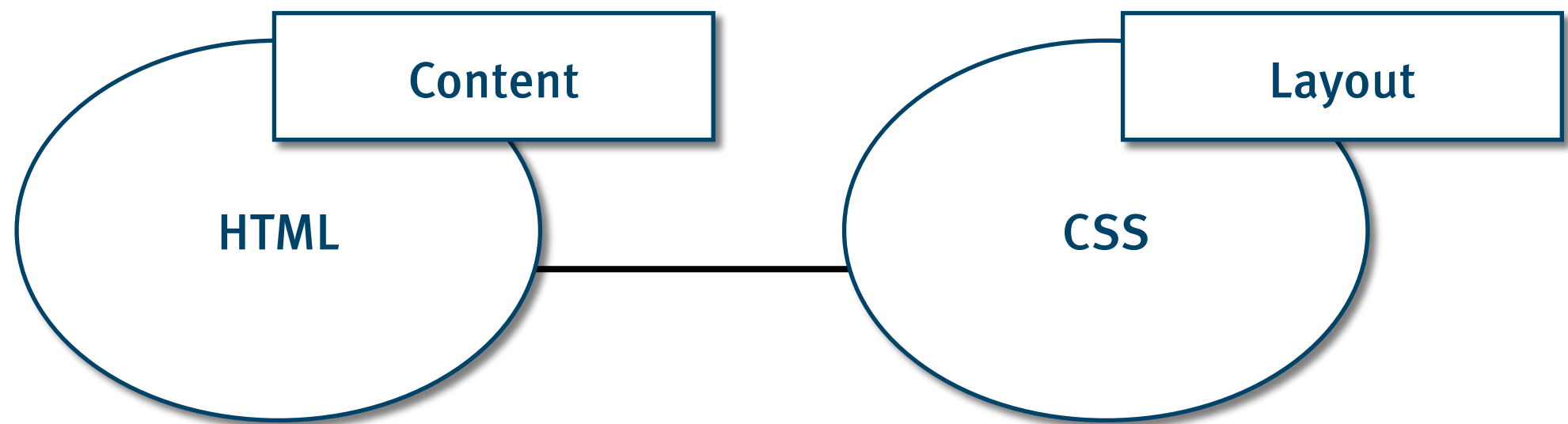
```
$("#tabs").tabs();
```

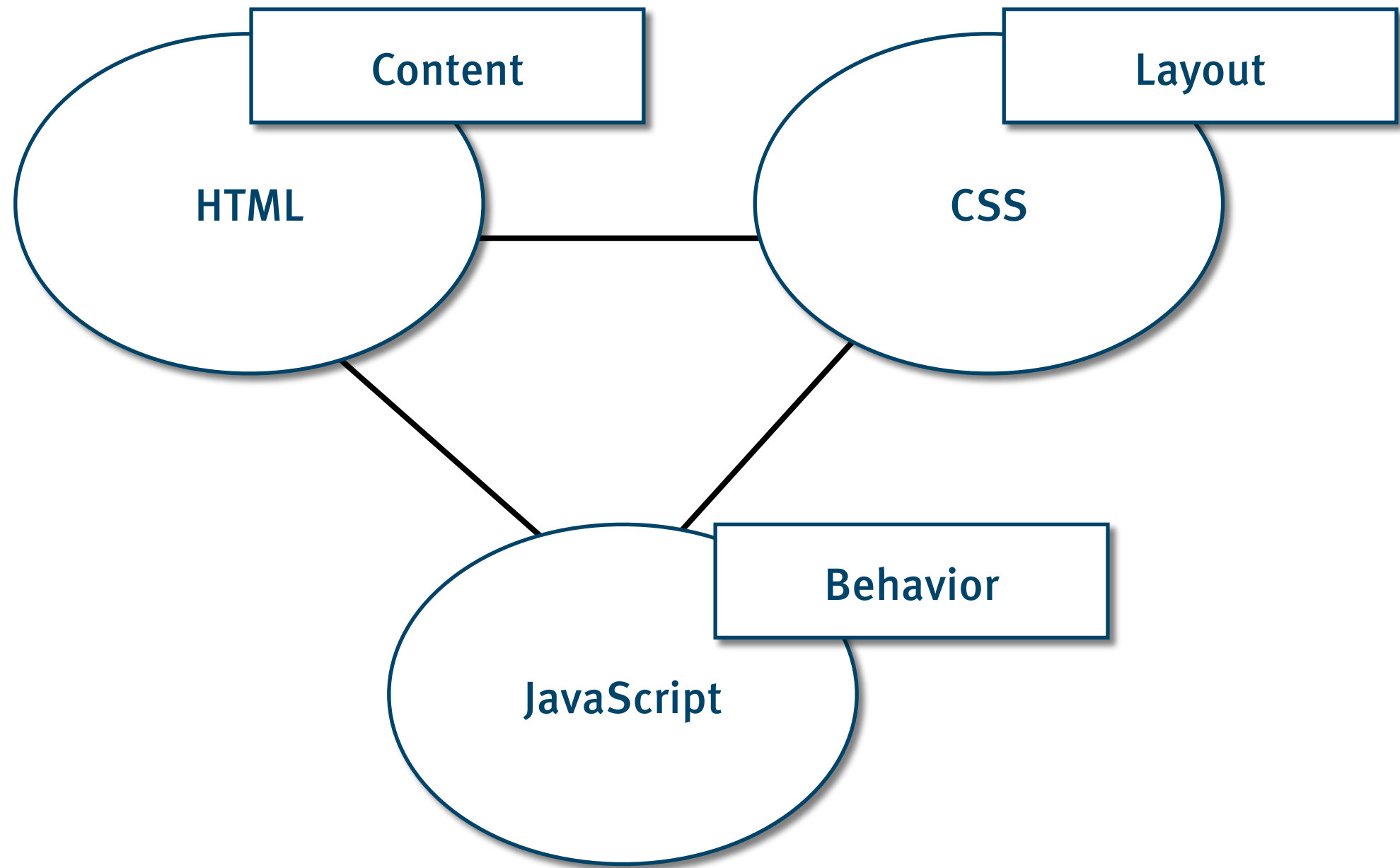
Nunc tincidunt

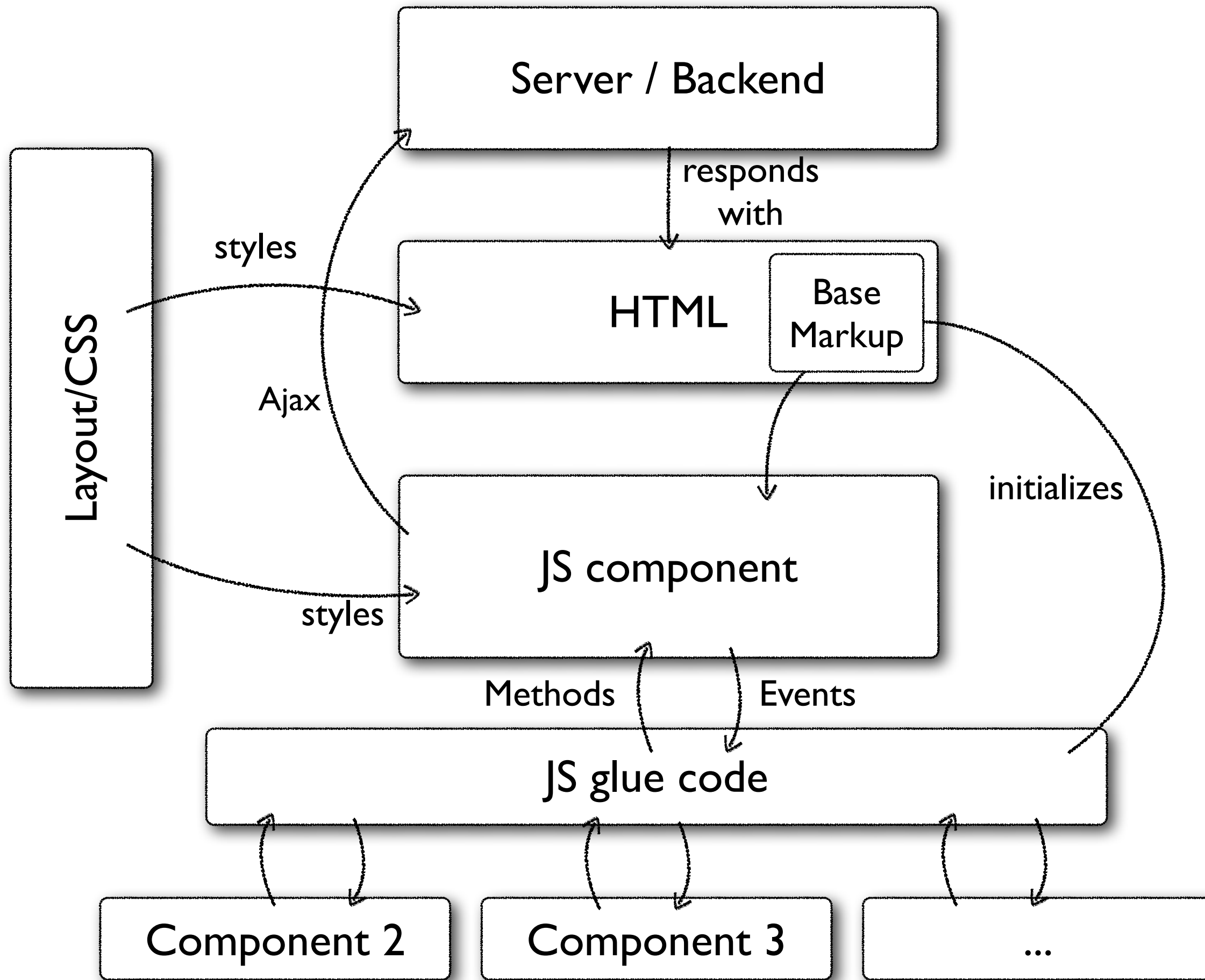
Proin dolor

Aenean lacinia

Proin elit arcu, rutrum commodo, vehicula tempus, commodo a, risus. Curabitur nec arcu. Donec sollicitudin mi sit amet mauris. Nam elementum quam ullamcorper ante. Etiam aliquet massa et lorem. Mauris dapibus lacus auctor risus. Aenean tempor ullamcorper leo. Vivamus sed magna quis ligula eleifend adipiscing. Duis orci. Aliquam sodales tortor vitae ipsum. Aliquam nulla. Duis aliquam molestie erat. Ut et mauris vel pede varius sollicitudin. Sed ut dolor nec orci tincidunt interdum. Phasellus ipsum. Nunc tristique tempus lectus.





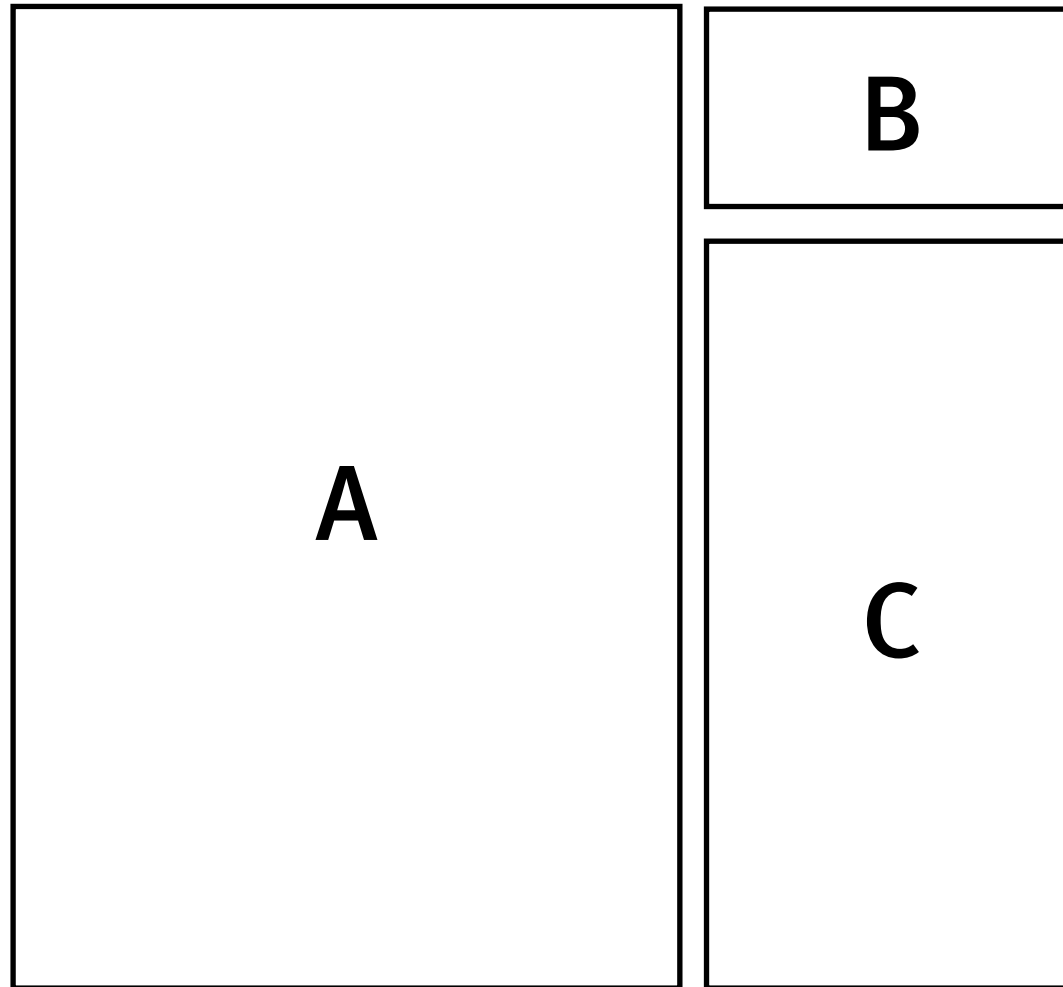


**Use URIs to identify a *single*  
meaningful concept**

**http://.../A**

**A**

**http://.../A**

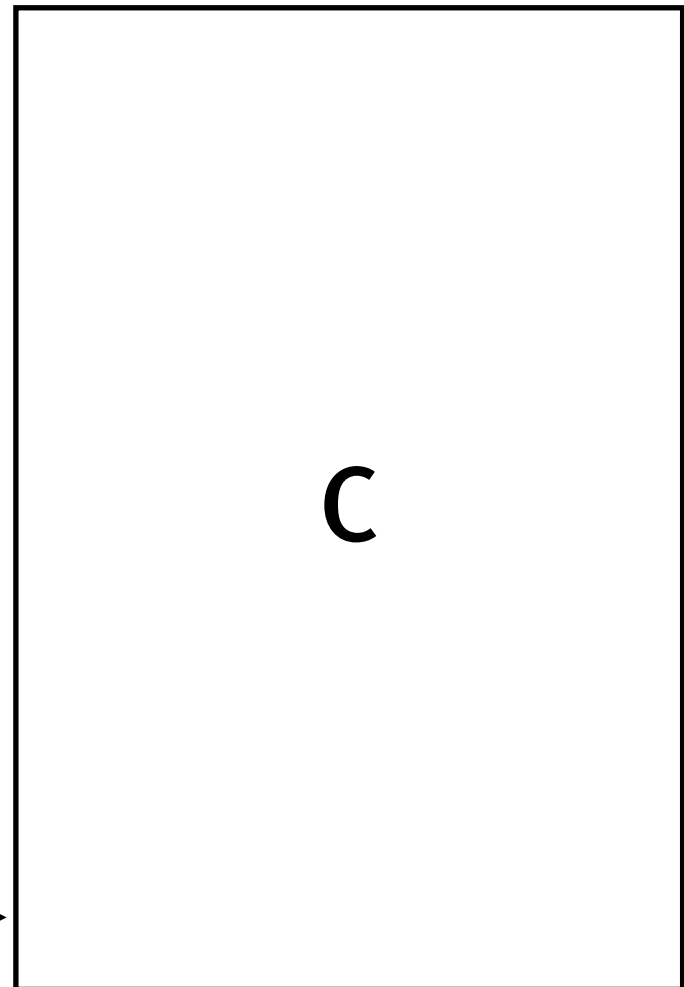
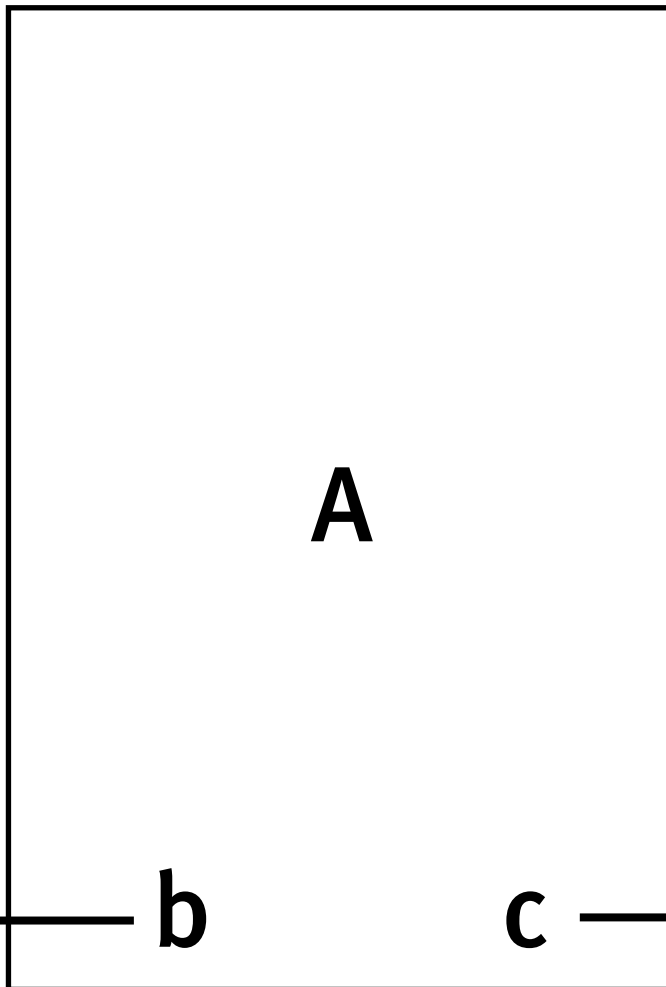
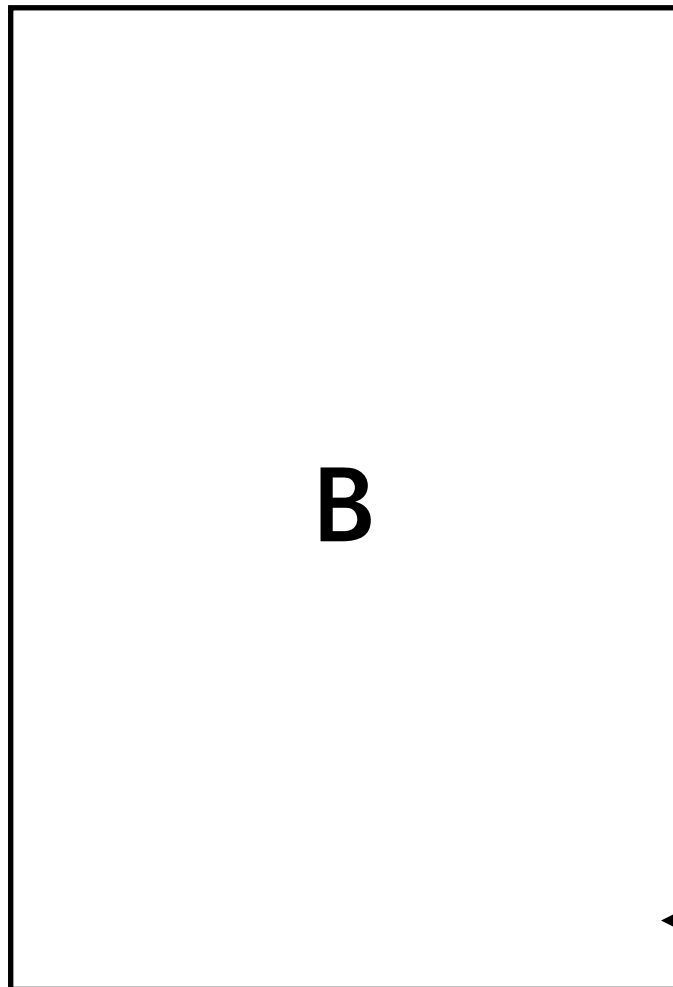




**http://.../B**

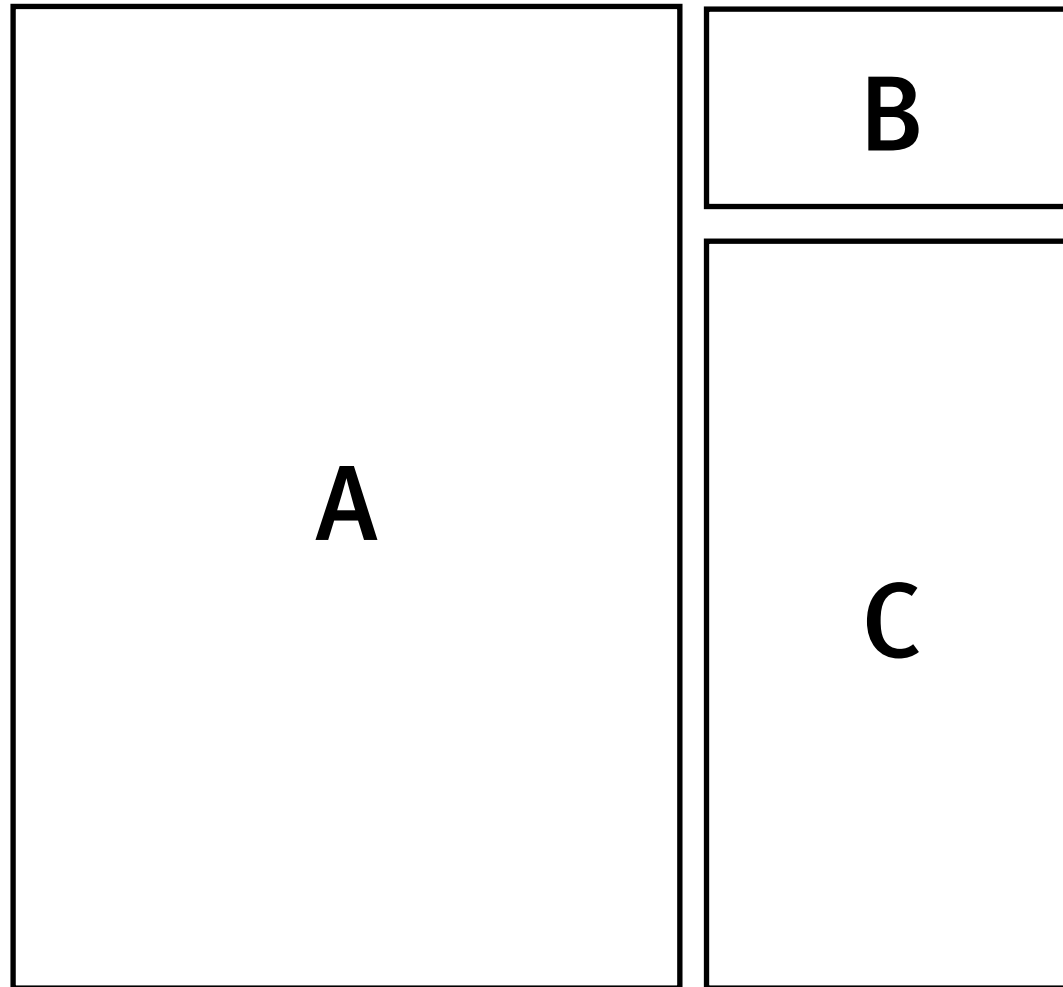
**http://.../A**

**http://.../C**



**+ AJAX + CSS**

**http://.../A**



# **Don't *disable* Browser Features – *use them***

**Multiple tabs & windows**

**Bookmarks**

**Back/Forward/Refresh**

**Personalization**

**Menus**

**Recommendation #7:**  
***Apply the Web instead of working  
around it.***

# Automate. Seriously.

# Testing

# Delivery



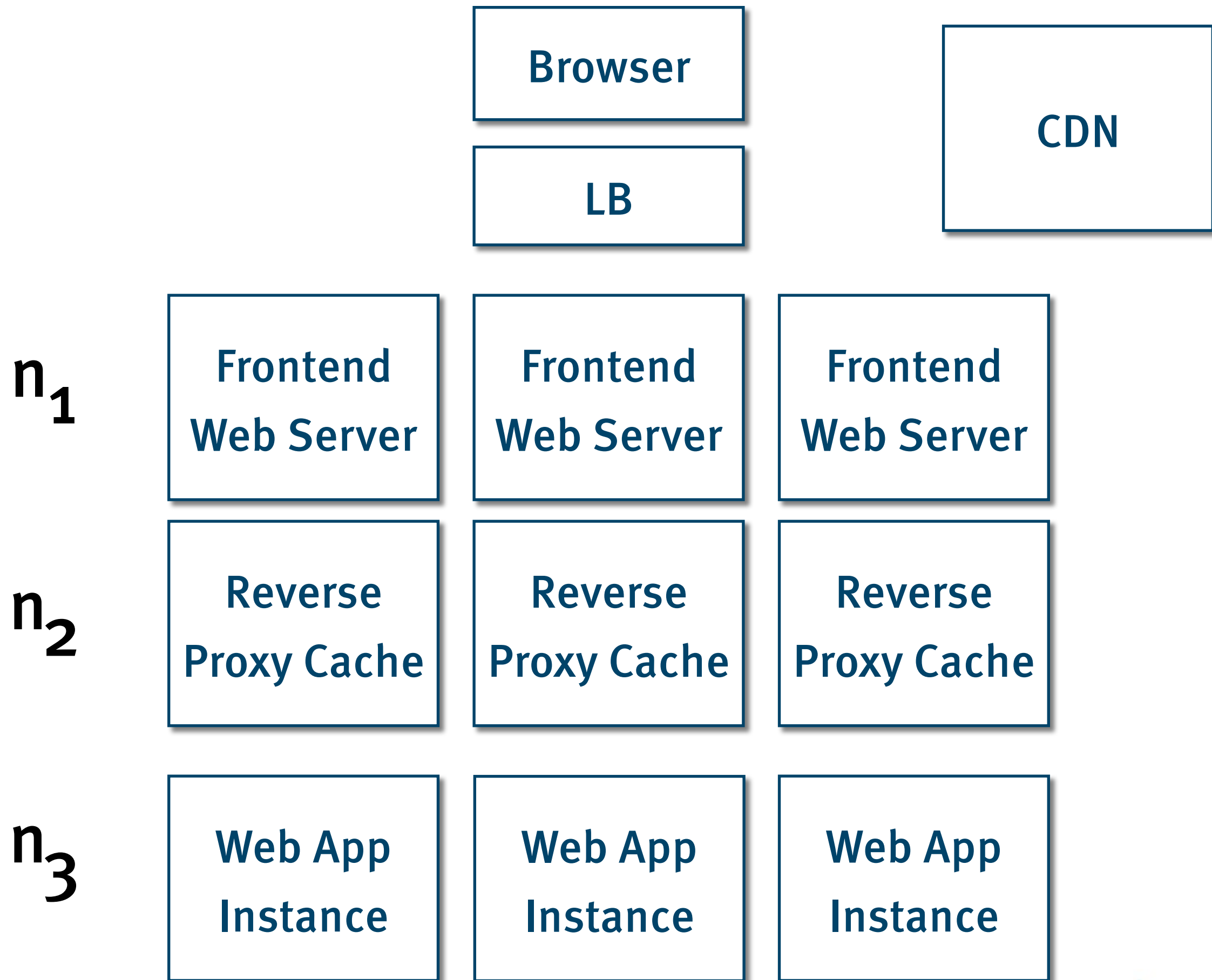
# Operations

# Back-office tasks

## **Recommendation #8:**

***Automate everything or you will be hurt.***

# Web architecture tooling



## **Recommendation #9:**

***Know, design for & use web components***

# Design for scale with care

# NoSQL



***Cassandra***





# Servers and Caches

The NGINX logo is displayed in white, uppercase letters on a dark teal rectangular background.

# Cloud Platforms



**Transient**

**Sharded**

**Unshared**

**Horizontally  
Scalable**

# Ye Good Ol' SQL RDBMS



**Recommendation #10:**  
***You can use new-fangled stuff,  
but you might not have to.***

# Q&A

Stefan Tilkov

stefan.tilkov@innoq.com

@stilkov

Phone: +49 170 471 2625



**innoQ Deutschland GmbH**

Krischerstr. 100  
40789 Monheim am Rhein  
Germany  
Phone: +49 2173 3366-0  
<http://www.innoq.com>

**innoQ Schweiz GmbH**

Gewerbestr. 11  
CH-6330 Cham  
Switzerland  
Phone: +41 41 743 0116  
[info@innoq.com](mailto:info@innoq.com)

