

Braid: Synchronization for HTTP

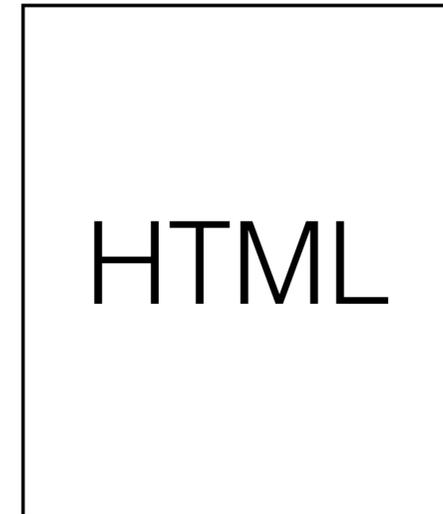
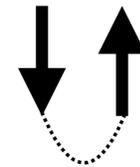
Michael Toomim
Invisible College

The WWW was designed for Static Pages

1993



HTTP



1993

The screenshot shows the NCSA Mosaic browser interface. The main window displays the NCSA Mosaic Home Page, which includes a logo for NCSA Mosaic and a welcome message. A secondary window titled "The World Wide Web project" is open, displaying the text of the "World Wide Web" project page. The browser's menu bar includes File, Edit, Options, Navigate, Hotlist, and Annotate. The document title is "NCSA Mosaic Home Page" and the URL is "http://www.ncsa.uiuc.edu/SDG/Software/Mosaic/NCSAMosaicHome.html".

WorldWideWeb
Info
Navigate

NCSA Mosaic for MS Windows
File Edit Options Navigate Hotlist Annotate

Document Title: NCSA Mosaic Home Page
Document URL: http://www.ncsa.uiuc.edu/SDG/Software/Mosaic/NCSAMosaicHome.html

N C S A
M O S A I C
X Window System • Microsoft Windows • Macintosh

Welcome to NCSA Mosaic, an Internet information browser and Mosaic was developed at the National Center for Supercomputing University of Illinois in --> Urbana-Champaign. NCSA Mosaic The Board of Trustees of the University of Illinois (UI), and UI.

Jan `97

The Software Development Group at NCSA has worked on NCSA Mosaic and we've learned a lot in the process. We are honored that this technology to the masses and appreciated all the support received in return. However, the time has come for us to commit resources in other areas of interest and development on Mosaic.

All information about the Mosaic project is available from:

NCSA Mosaic Platforms:

- NCSA Mosaic for the X Window System
- NCSA Mosaic for the Apple Macintosh
- NCSA Mosaic for Microsoft Windows

World Wide Web Resources The following resources are available in cyberspace and keep track of its growth:

- A glossary of World Wide Web terms and acronyms

The World Wide Web project

World Wide Web

The WorldWideWeb (W3) is a wide-area hypermedia information retrieval initiative aiming to give universal access to a large universe of documents.

Everything there is online about W3 is linked directly or indirectly to this document, including an [executive summary](#) of the project, [Mailing lists](#), [Policy](#), [November's W3 news](#), [Frequently Asked Questions](#).

[What's out there?](#) Pointers to the world's online information, [subjects](#), [W3 servers](#), etc.

[Help](#) on the browser you are using

[Software Products](#) A list of W3 project components and their current state. (e.g. [Line Mode](#), [X11 Viola](#), [NeXTStep](#), [Servers](#), [Tools](#), [Mail robot](#), [Library](#))

[Technical](#) Details of protocols, formats, program internals etc

[Bibliography](#) Paper documentation on W3 and references.

[People](#) A list of some people involved in the project.

[History](#) A summary of the history of the project.

[How can I help?](#) If you would like to support the web.

[Getting code](#) Getting the code by [anonymous FTP](#), etc.

```
1 <HEADER>
2 <TITLE>The World Wide Web project</TITLE>
3 <NEXTID N="55">
4 </HEADER>
5 <BODY>
6 <H1>World Wide Web</H1>The WorldWideWeb (
7 NAME=0 HREF="WhatIs.html">
8 hypermedia</A> information retrieval
9 initiative aiming to give universal
10 access to a large universe of documents.<
11 Everything there is online about
12 W3 is linked directly or indirectly
13 to this document, including an <A
14 NAME=24 HREF="Summary.html">executive
```

1998



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[Linux Search](#)

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[About Google!](#)
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[Google! Logos](#)

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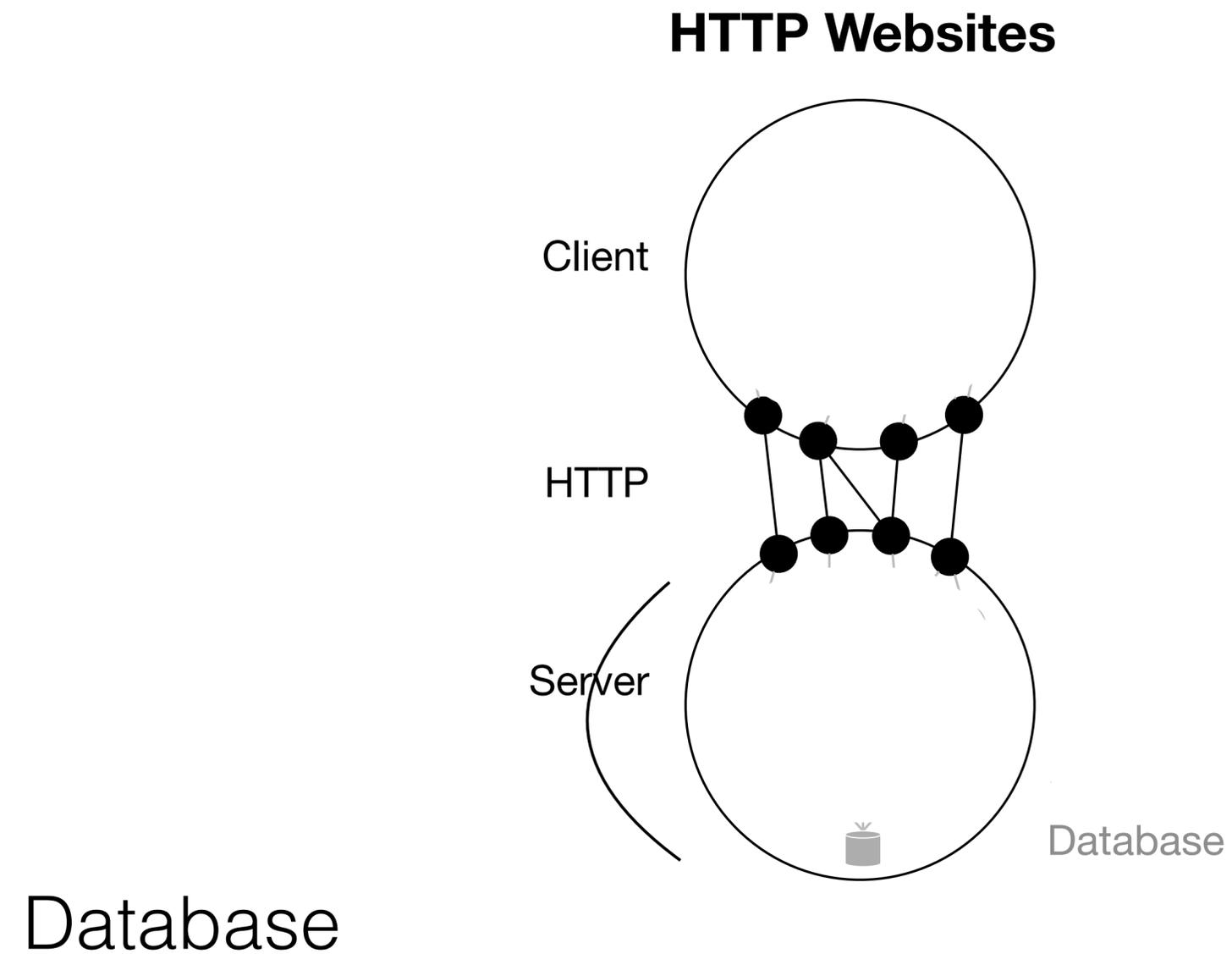
[Yahoo! Deutschland](#) [CLICK HERE TO VISIT THE STARS](#) [YAHOO! LOS ANGELES](#) [Weekly Picks](#)

[Options](#)

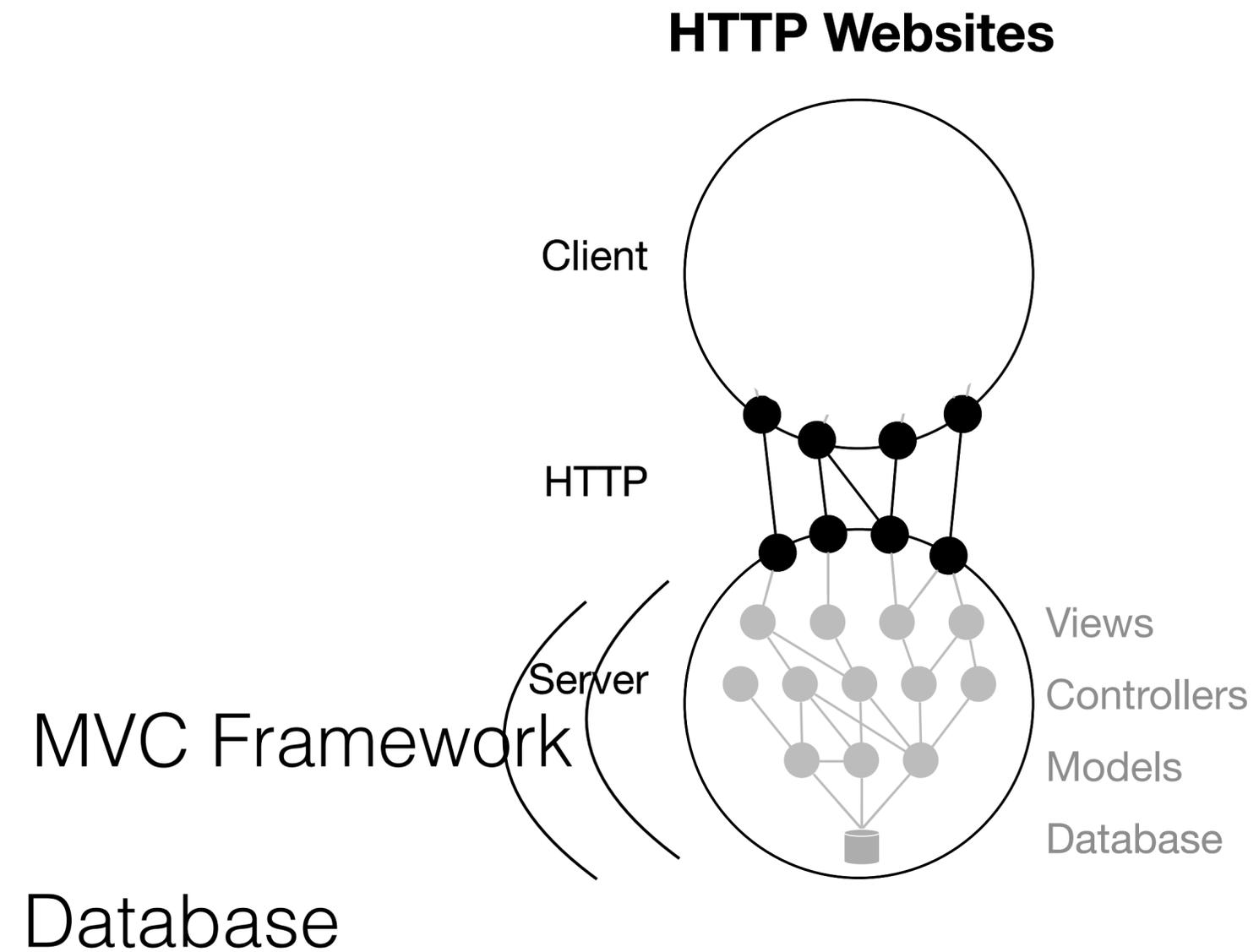
[Yellow Pages](#) - [People Search](#) - [City Maps](#) -- [News Headlines](#) - [Stock Quotes](#) - [Sports Scores](#)

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But now pages change a lot



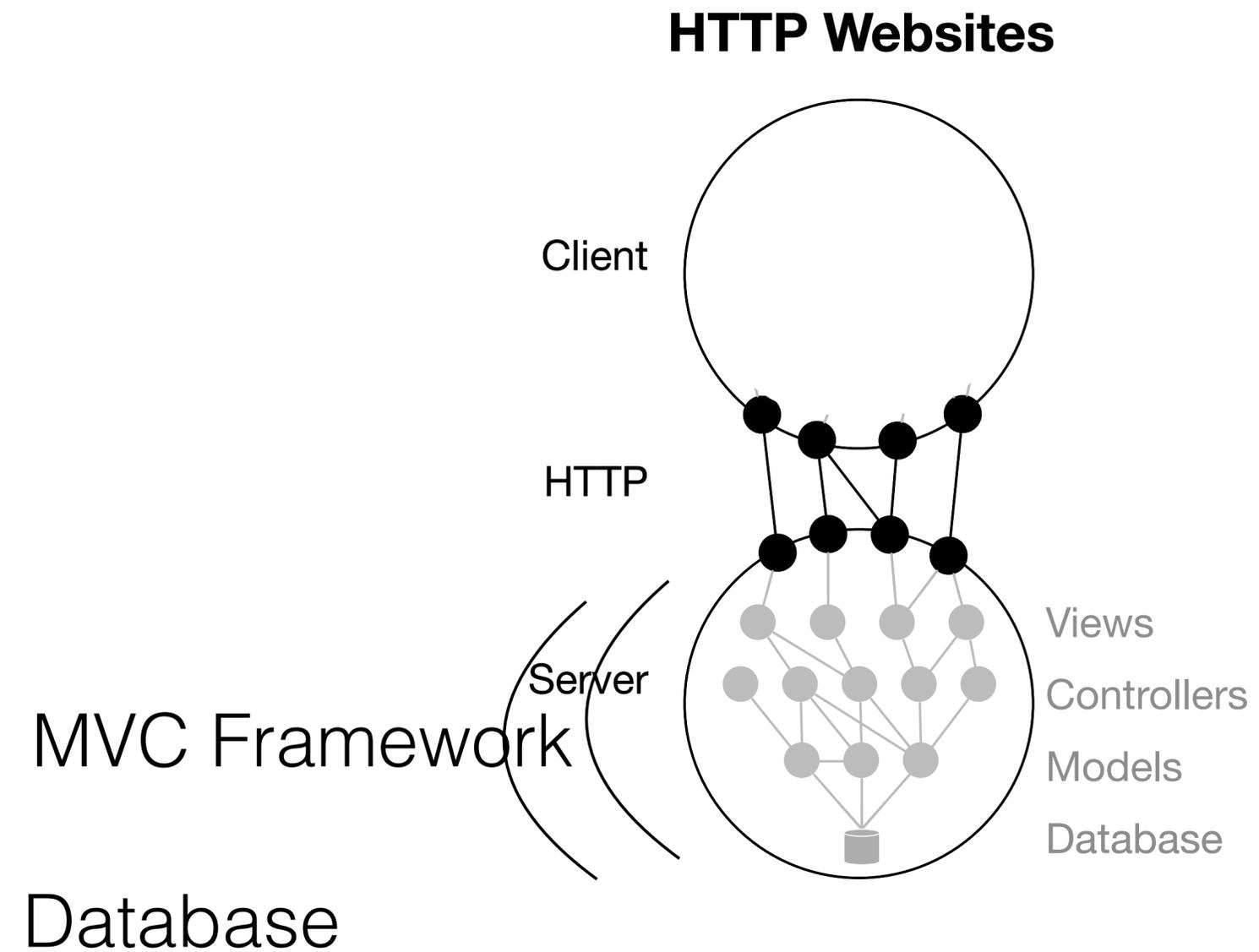
But now pages change a lot



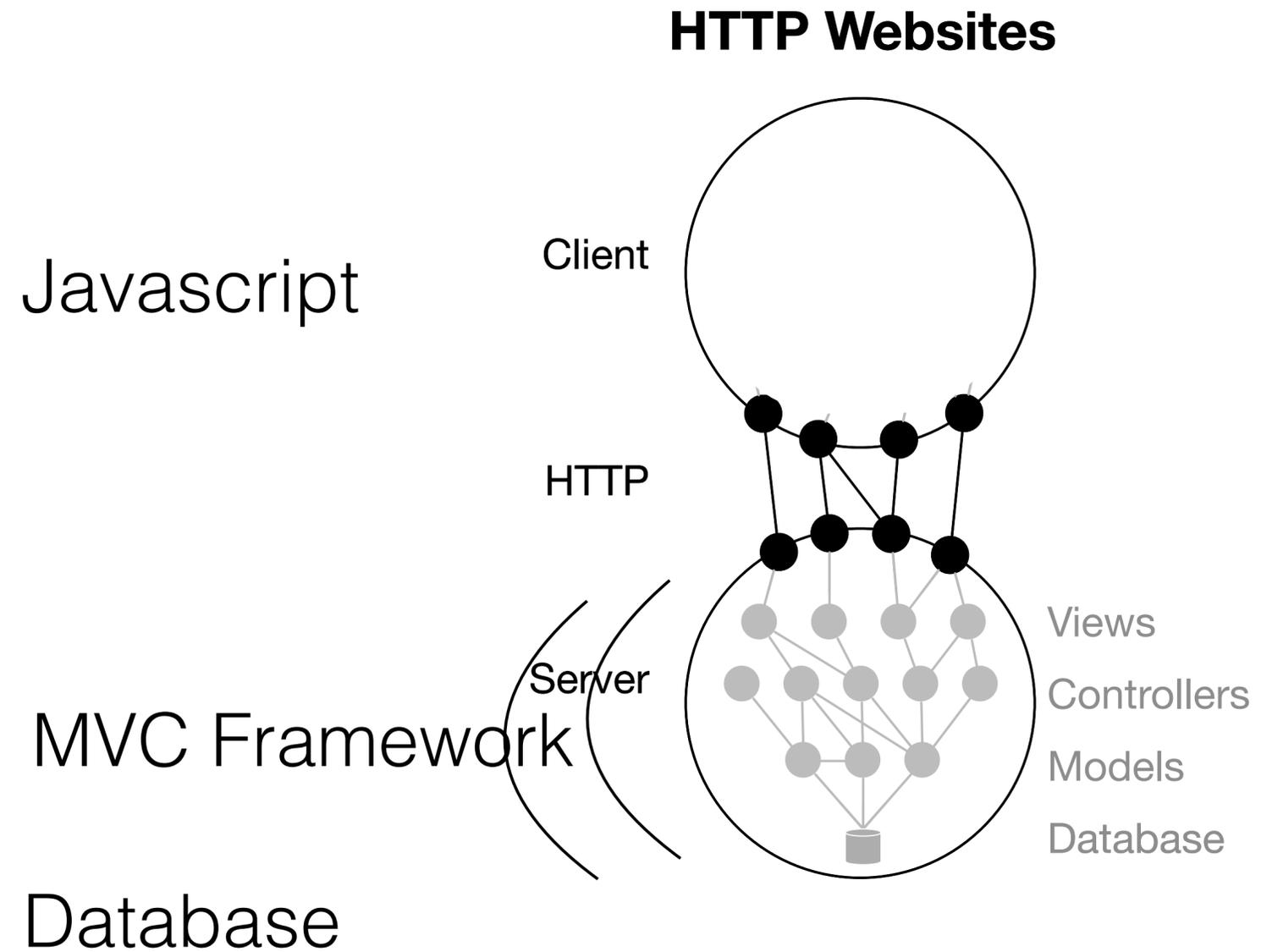
2011



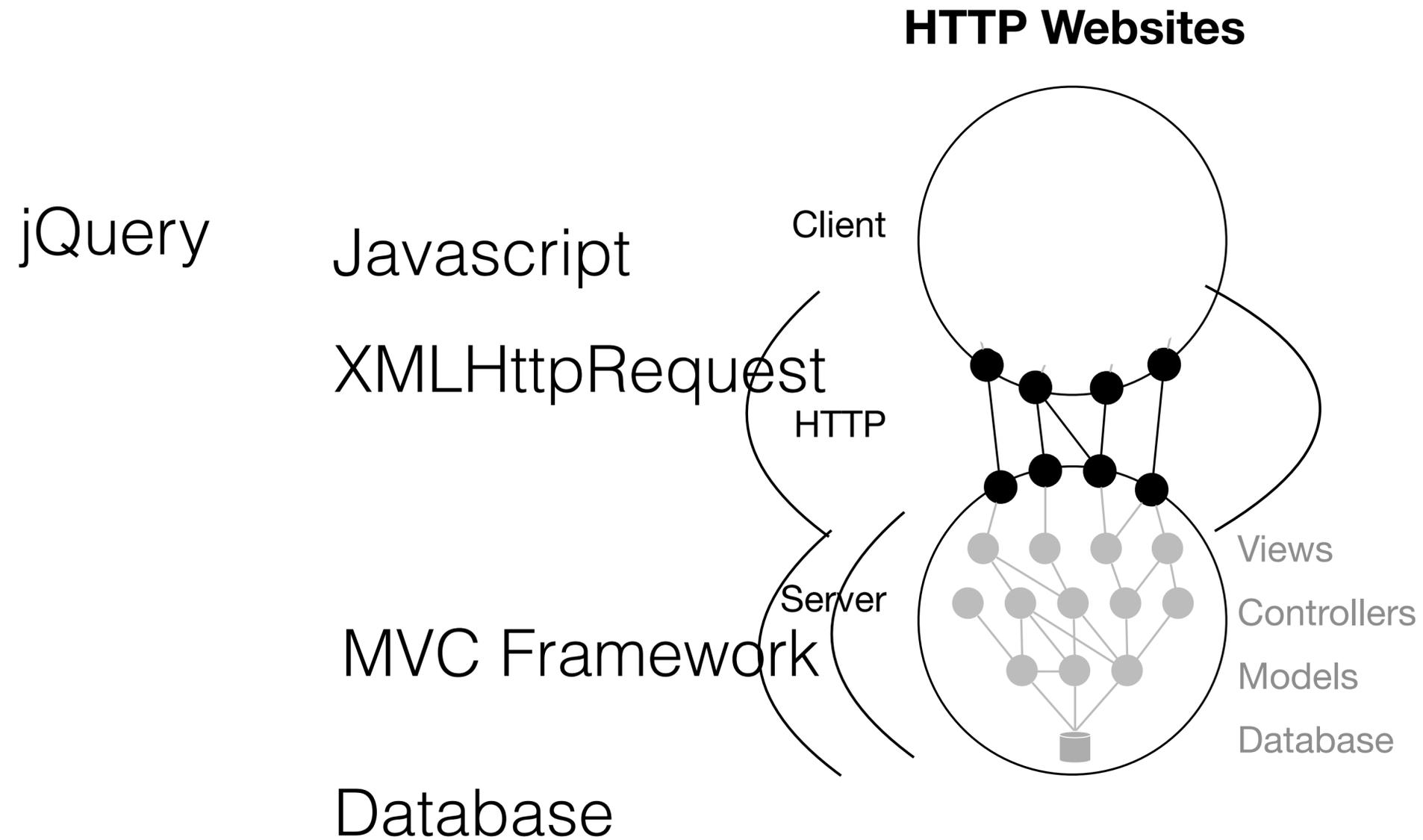
Pages now change



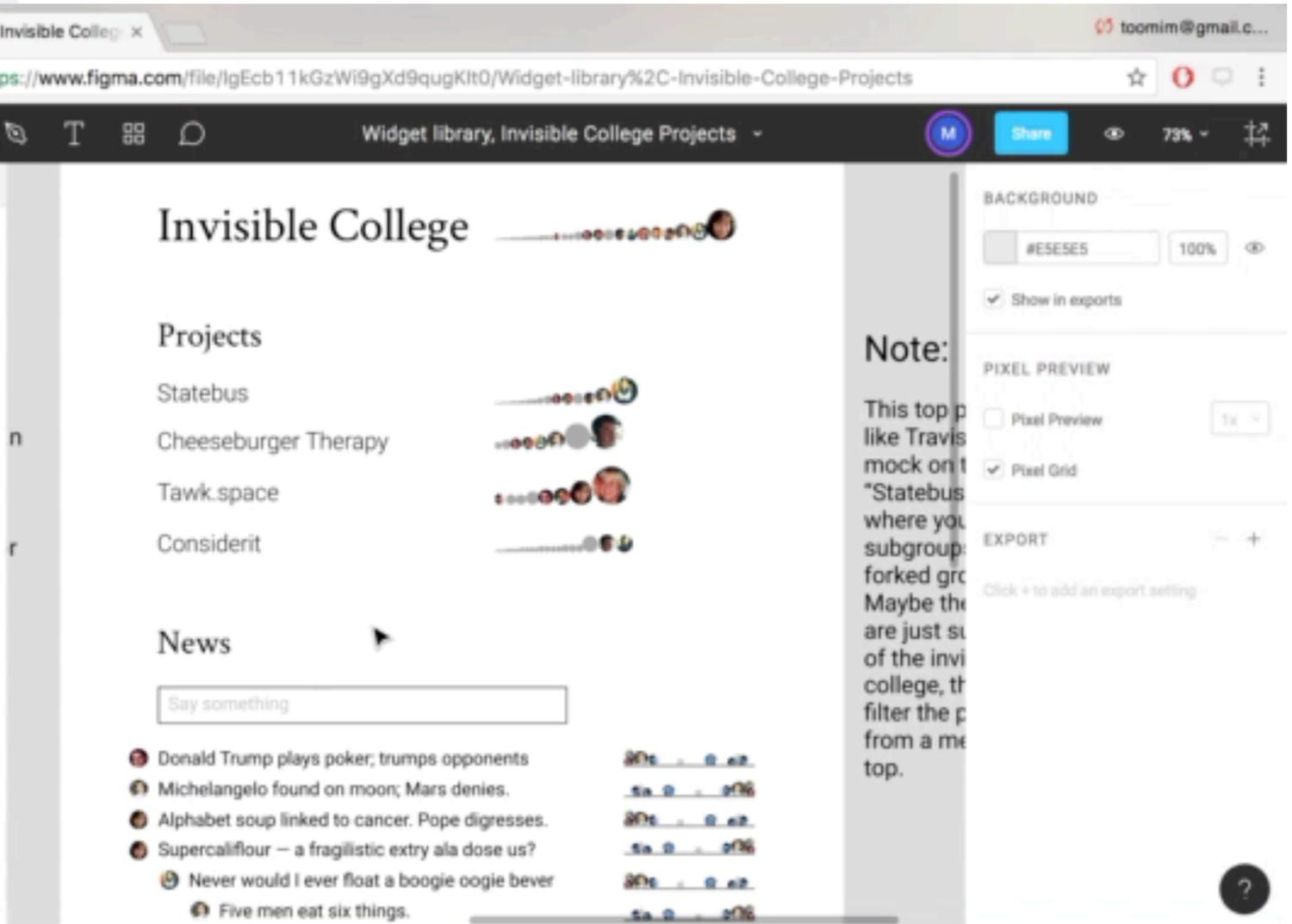
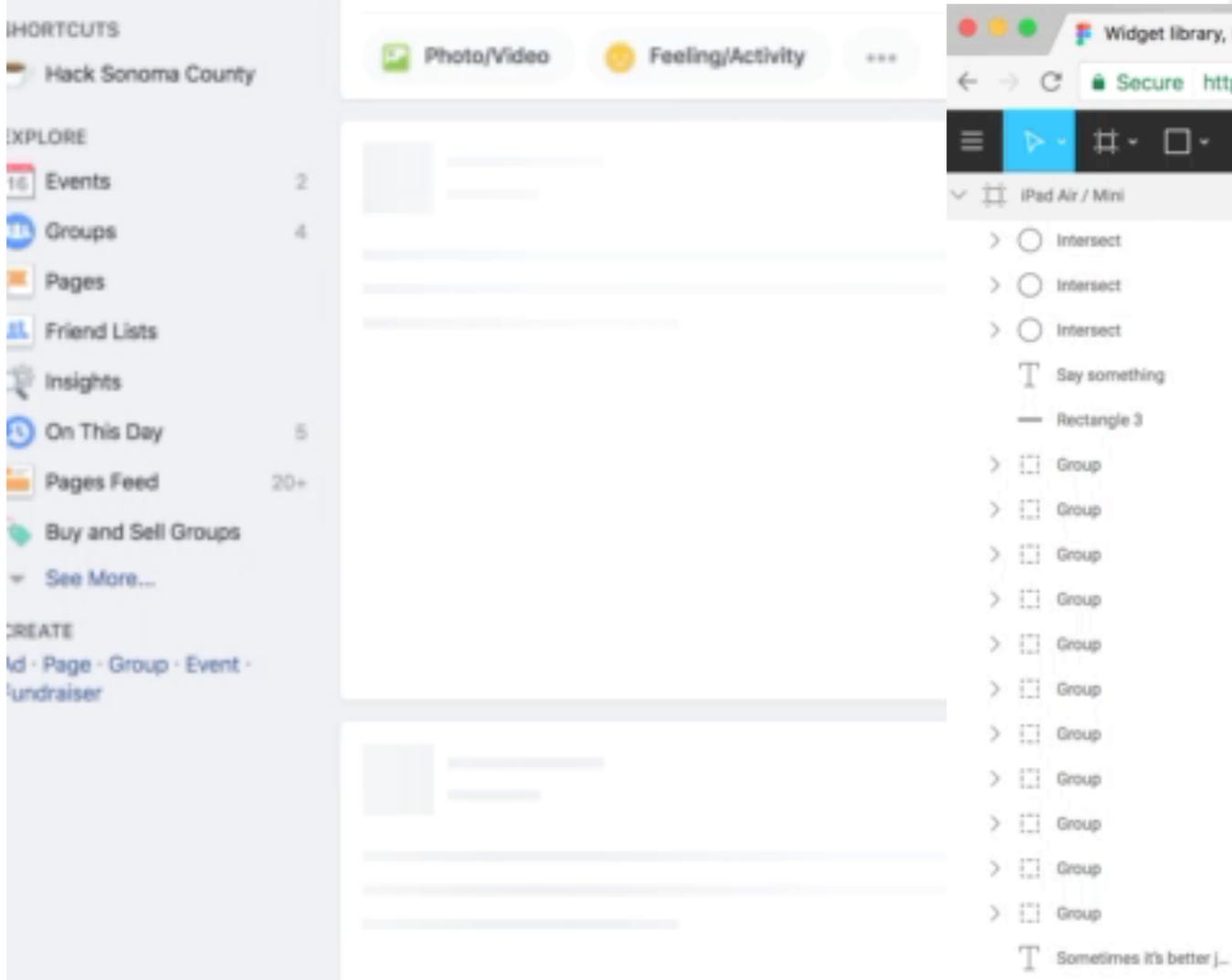
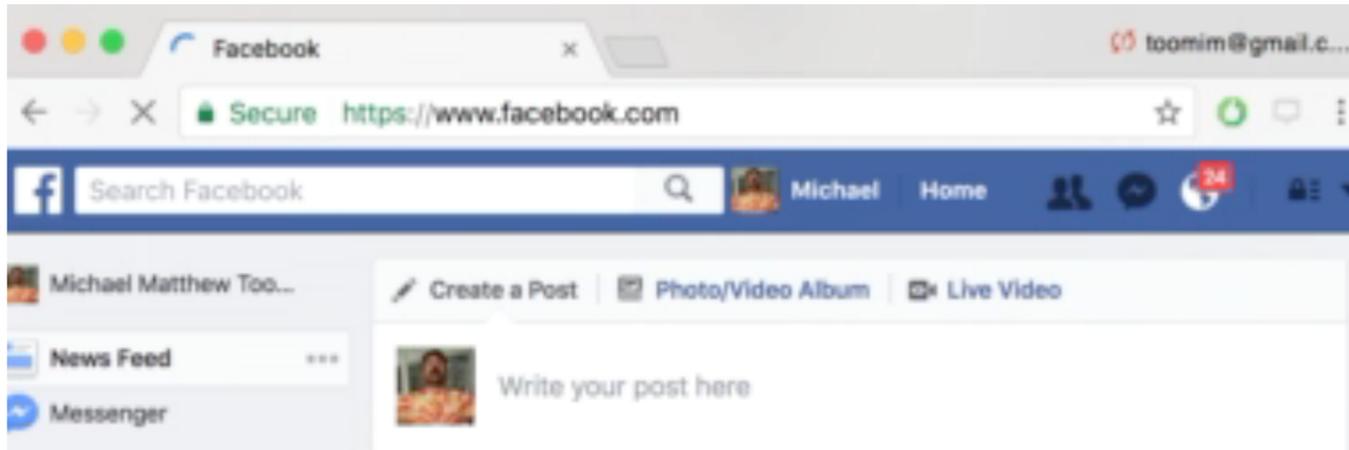
Pages now change change



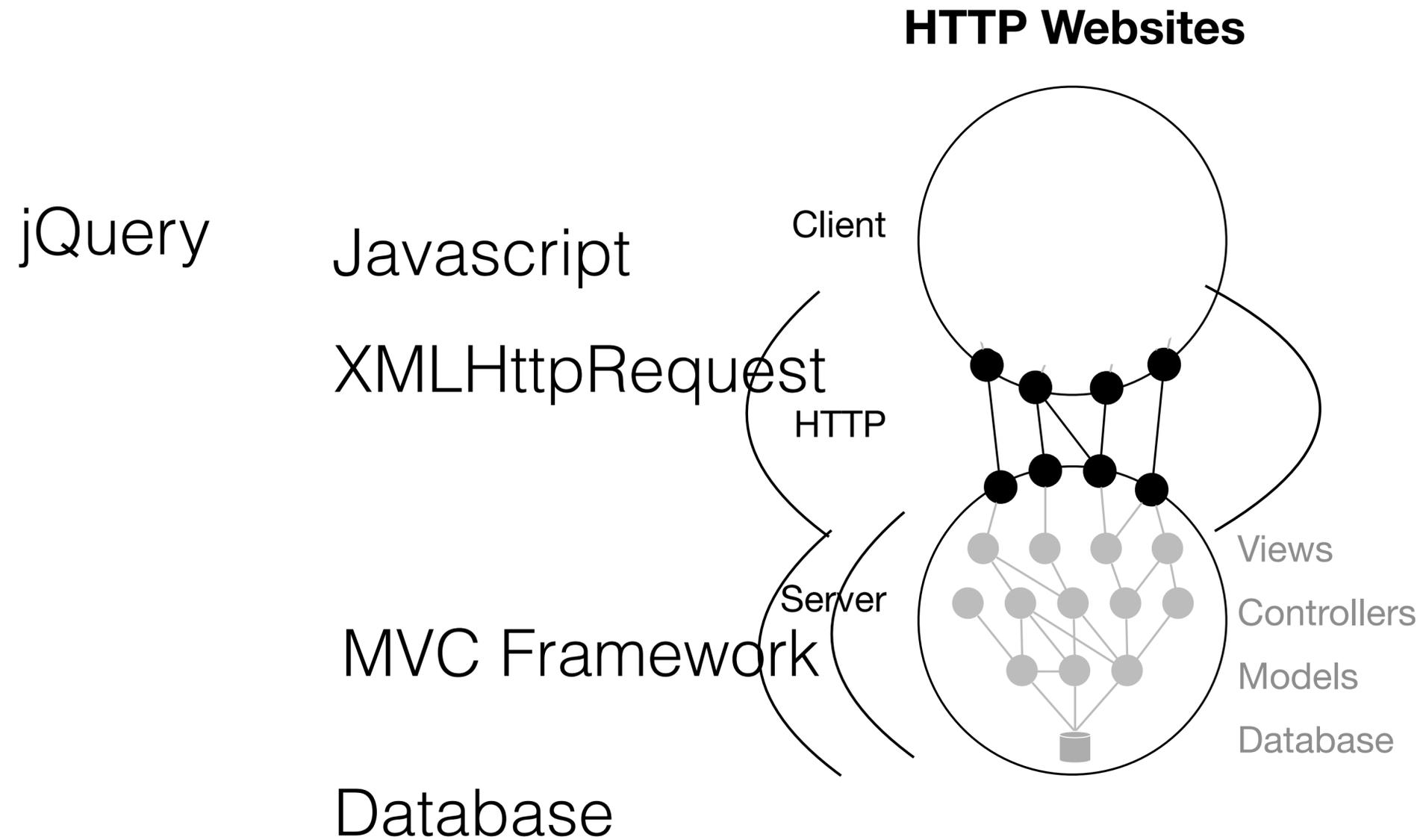
Pages now change change change



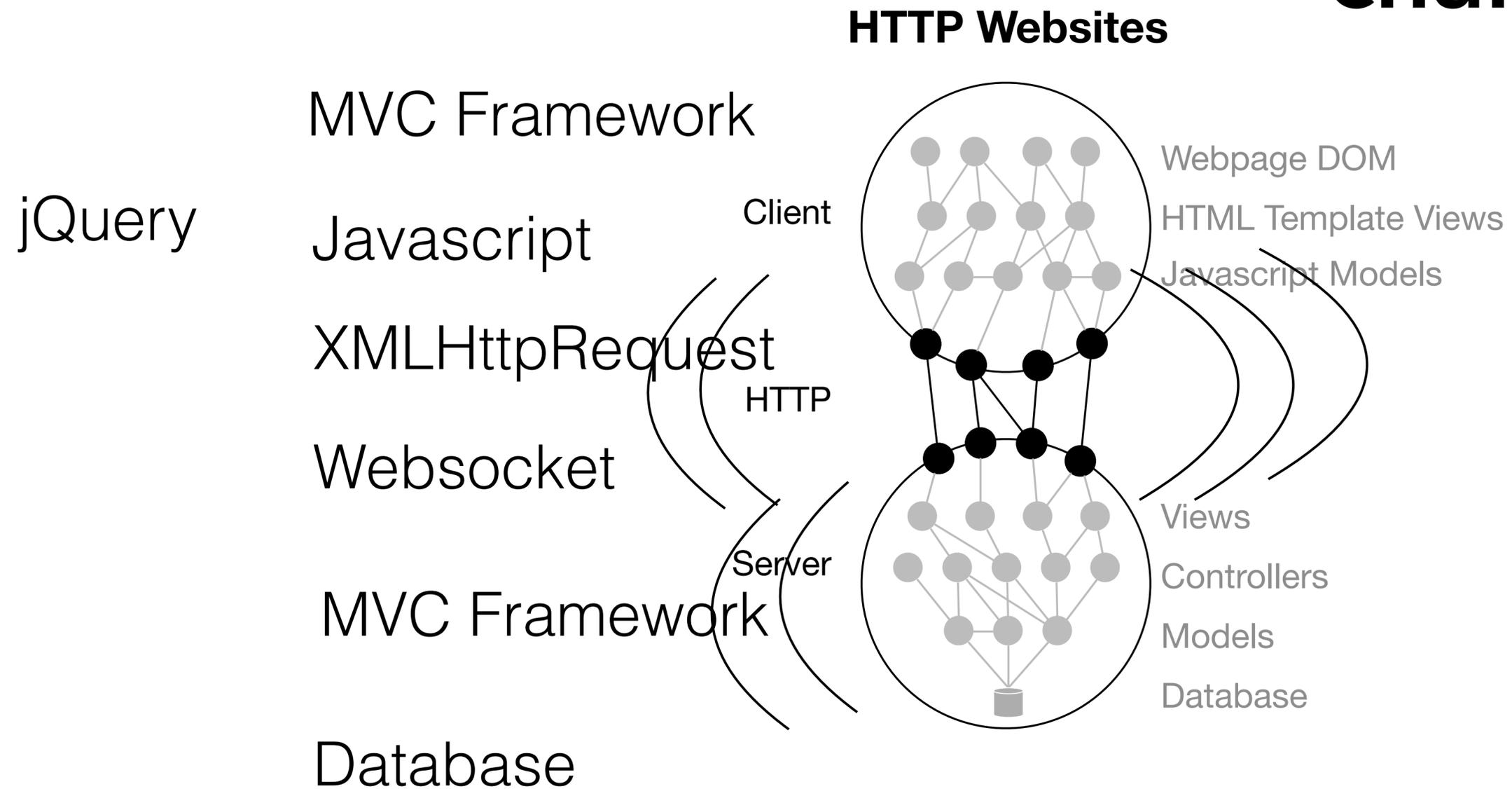
2017



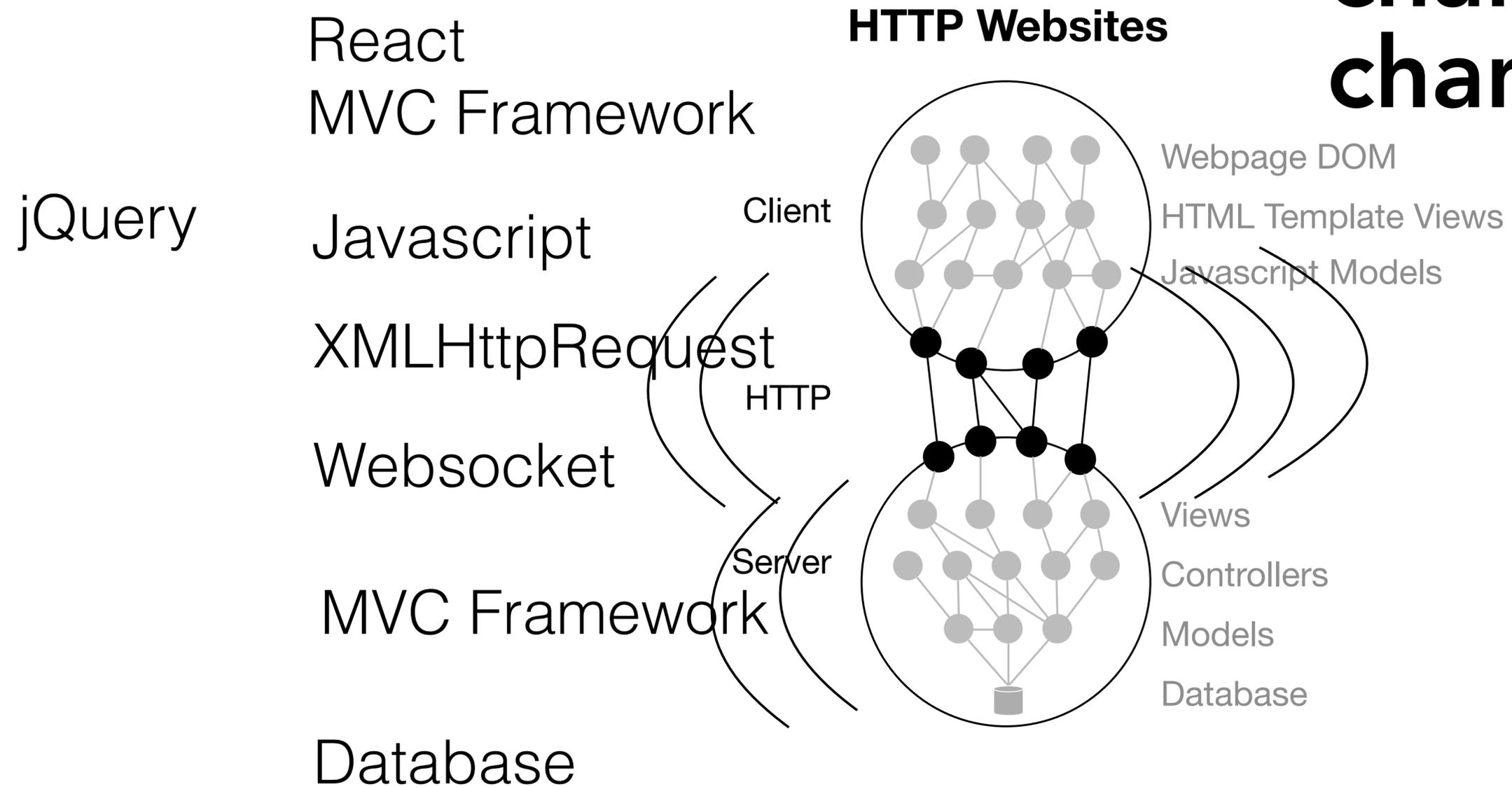
Pages now change change change change



Pages now change change change change change



Pages now change change change change change change



This is why web programming sucks

jQuery

Javascript

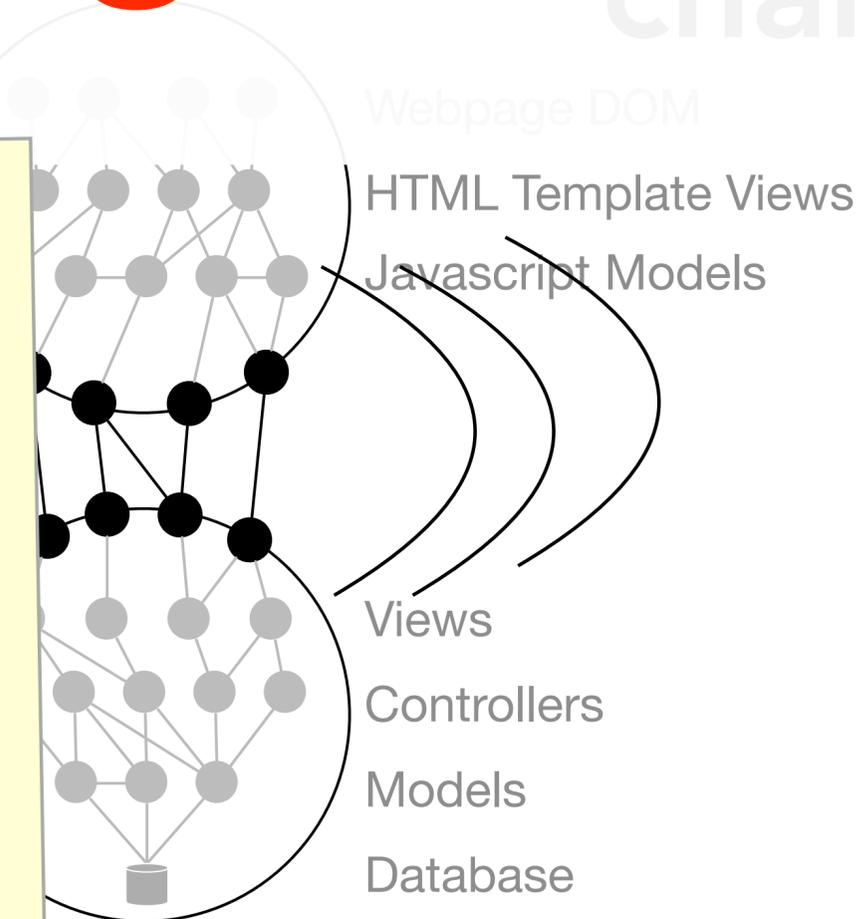
XMLHttpRequest

Websocket

MVC Framework

Databases

Webpack
babel
quick start
css
nodejs
postgres
mongo

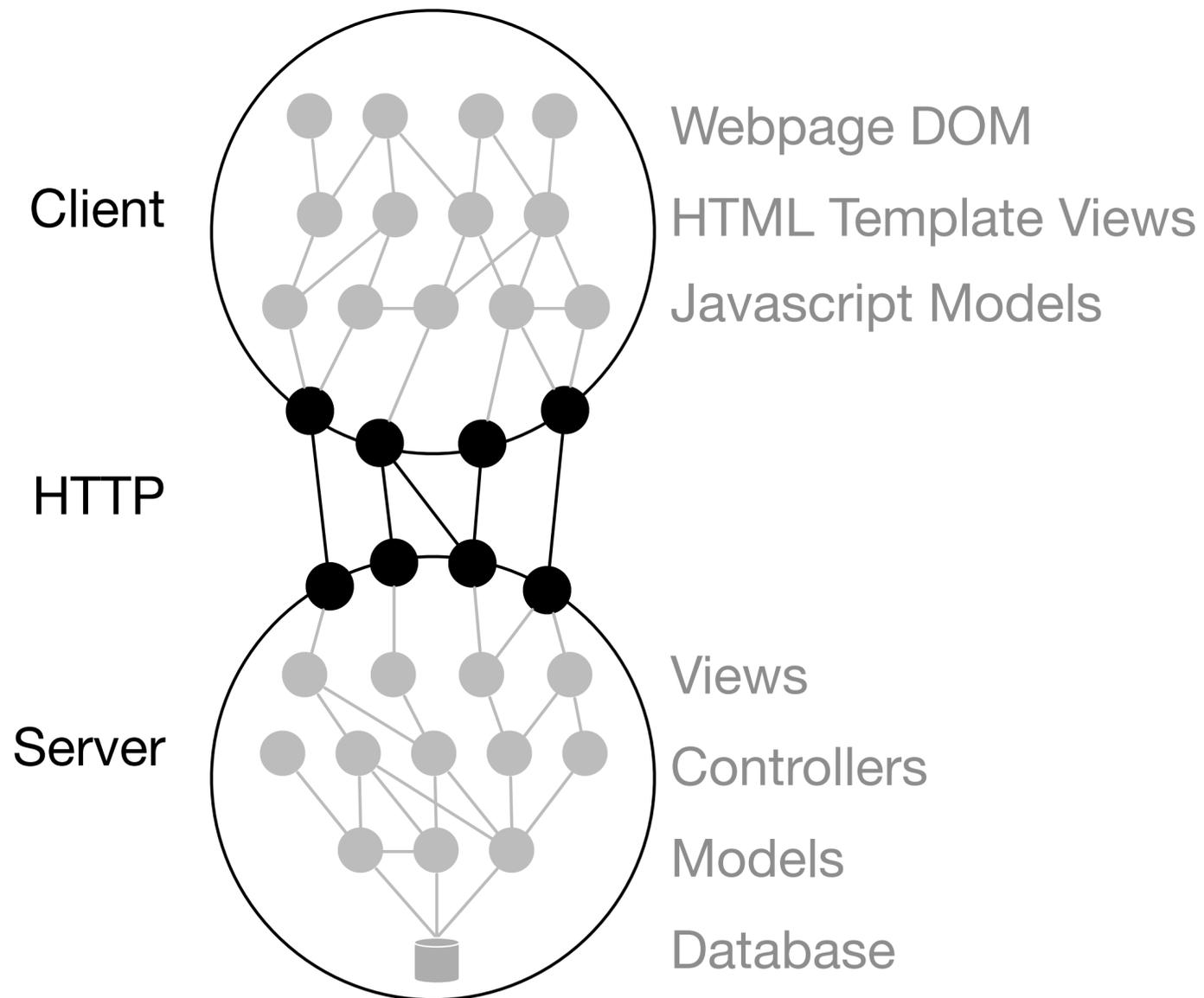


Braid extends HTTP with Synchronization

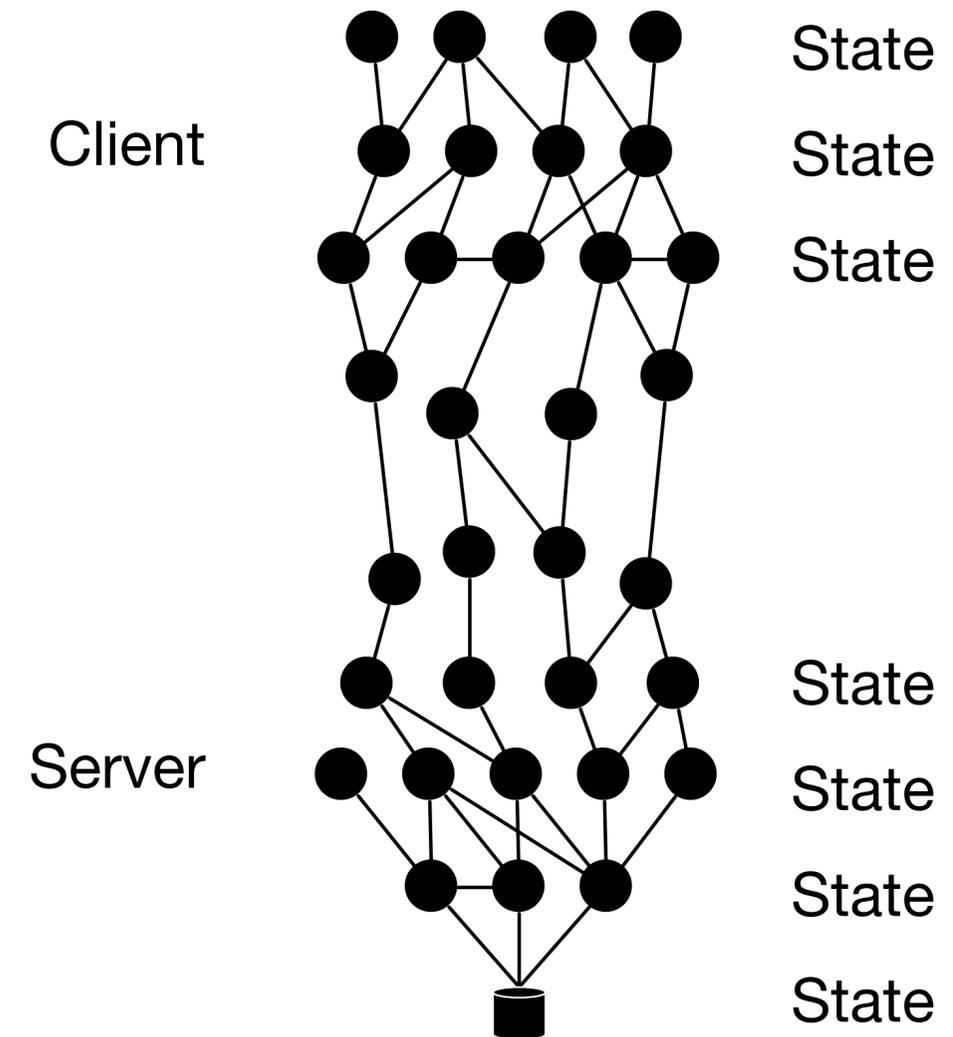
- CRDTs
- Operational Transform
- Version Control

Braid Synchronizes the Whole Stack

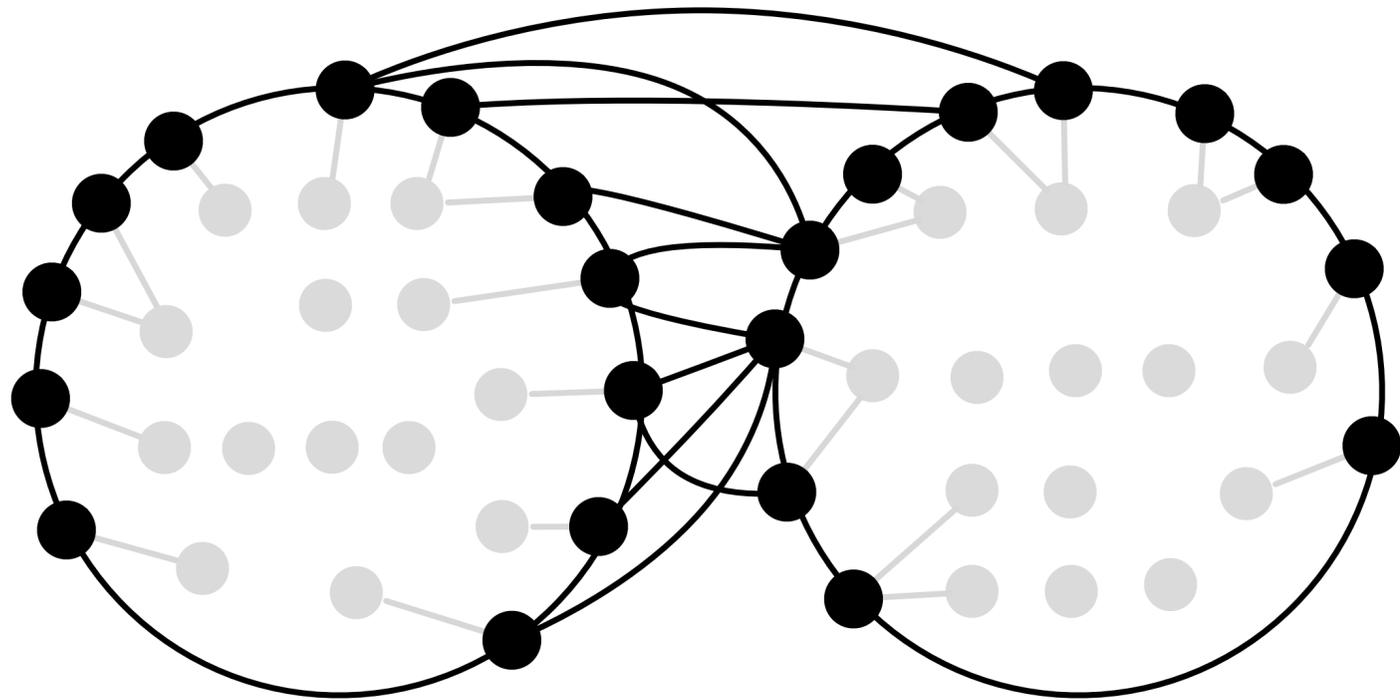
HTTP Websites



Braid Websites



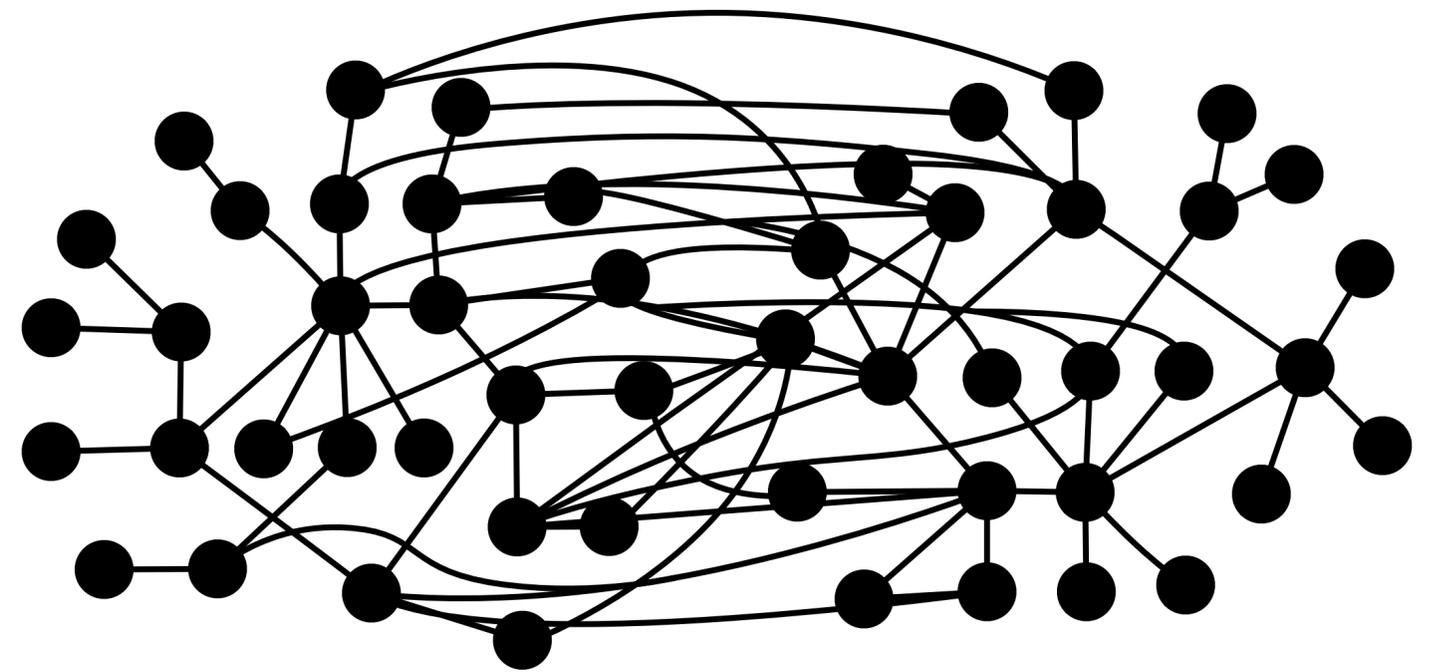
HTTP Websites



Facebook

NY Times

Braidsites



My stuff

Your stuff

Client 1 Text:
BBddppppZYRY

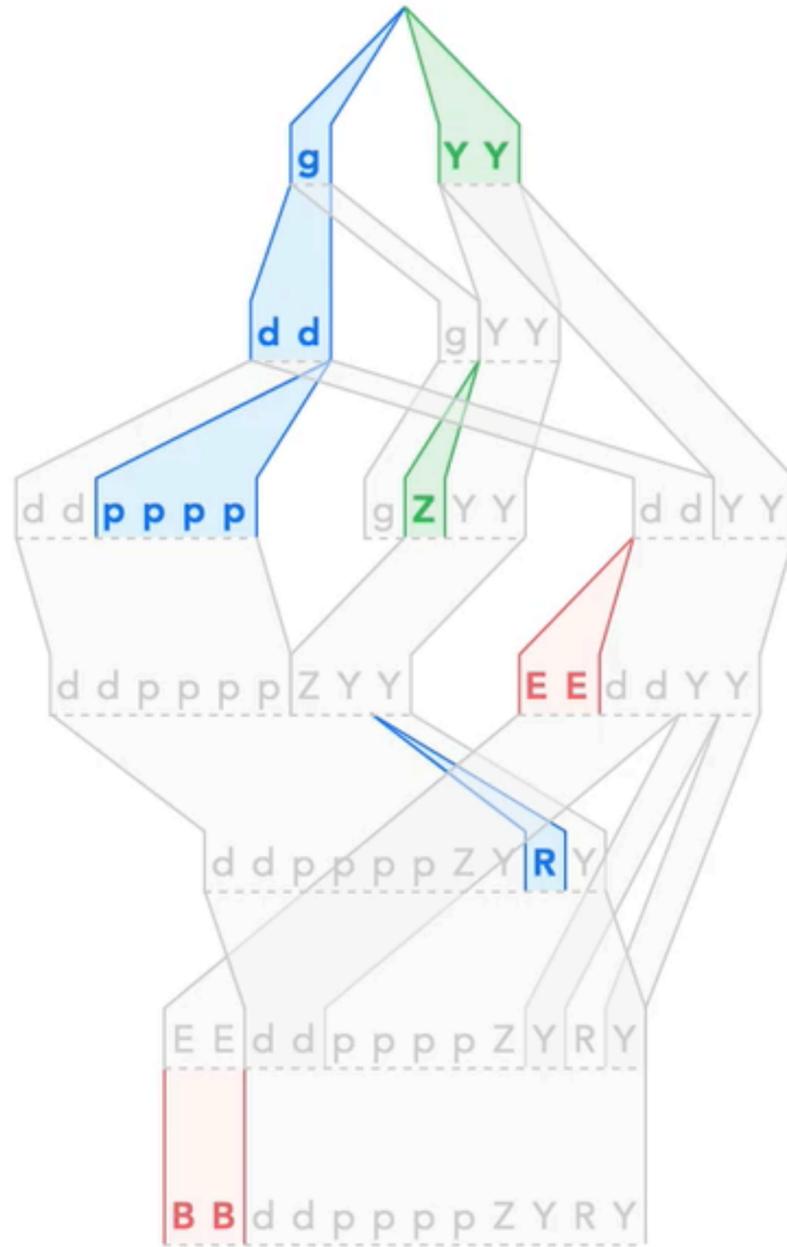
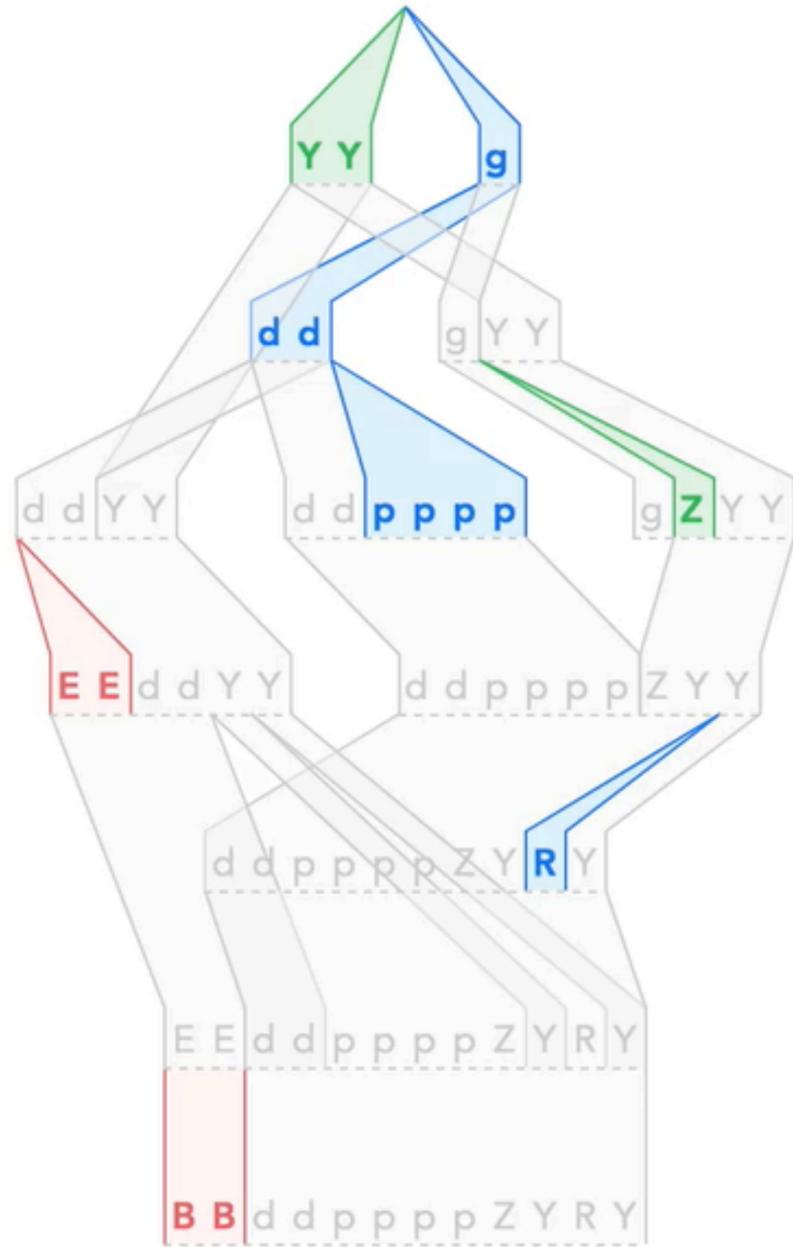
Client 2 Text:
BBddppppZYRY

Client 3 Text:
ddZYY

Client 1 Braid:

Client 2 Braid:

Client 3 Braid:



Client 1 Network messages:

Recv:{set: 'x', patches: ["[0:0] = \"YY\""], version: "c2", parents: ["v1"]}

Recv:{set: 'x', patches: ["[0:0] = \"g\""], version: "b2", parents: ["v1"]}

Recv:{set: 'x', patches: ["[0:1] = \"dd\""], version: "b3", parents: ["b2"]}

Client 2 Network messages:

Send:{set: 'x', patches: ["[0:0] = \"g\""], version: "b2", parents: ["v1"]}

Send:{set: 'x', patches: ["[0:1] = \"dd\""], version: "b3", parents: ["b2"]}

Send:{set: 'x', patches: ["[2:2] = \"pppp\""], version: "b4", parents: ["b3"]}

Client 3 Network messages:

Send:{set: 'x', patches: ["[0:0] = \"YY\""], version: "c2", parents: ["v1"]}

Recv:{set: 'x', patches: ["[0:0] = \"g\""], version: "b2", parents: ["v1"]}

Send:{set: 'x', patches: ["[1:1] = \"dd\""], version: "b3", parents: ["b2"]}

Benefits

- Caches are never stale
- Network only sends diffs
- Reload button obsolete
- Program with 70% less Javascript
- Every site gets an Offline Mode for free
- Every `<textarea>` becomes a collaborative editor
- Servers become optional
- Synchronize with any external website's internal state as easily as linking to it
- Make a new UI for any website

<https://braid.news>

My name is Michael Toomim

One more thing....

http:// → **web:**