

Running Experiments
Online

Before we start: Who are we?



Elisa Filevich (Cognitive Science, Metacognition)

+

Kristian Lange (Programmer, Back-end)

=

JATOS

Before we start: Who are you? (Disclaimer)

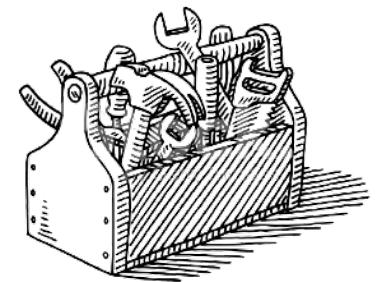


Do you have any concrete plans?
Are you just curious?

Can you program (in MATLAB/Python/Java)?
Do you know any HTML/JS/CSS?

PLEASE speak up if too fast/slow/boring/detailed/shallow

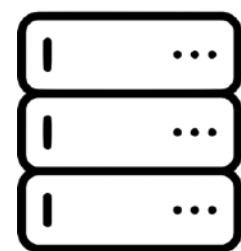
Roadmap



Tools available



Coding with web-technologies



Serving the Internet



Analyzing data collected online

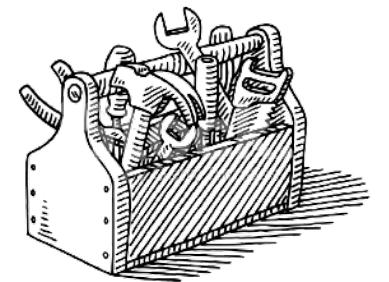


What is (im)possible online: timing and participants



Ethics and privacy

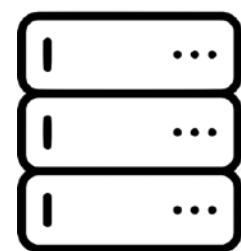
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Break



Analyzing data collected online

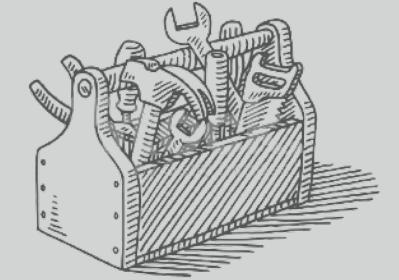


What is (im)possible online: timing and participants



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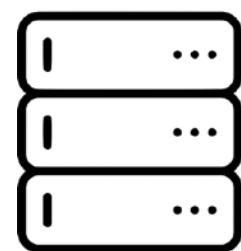
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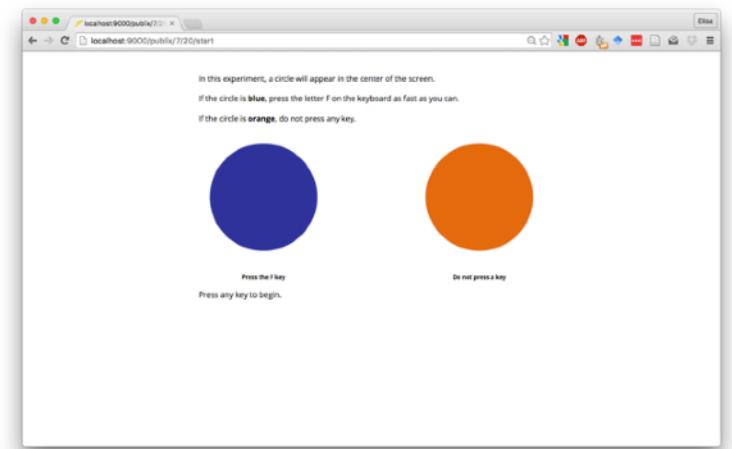
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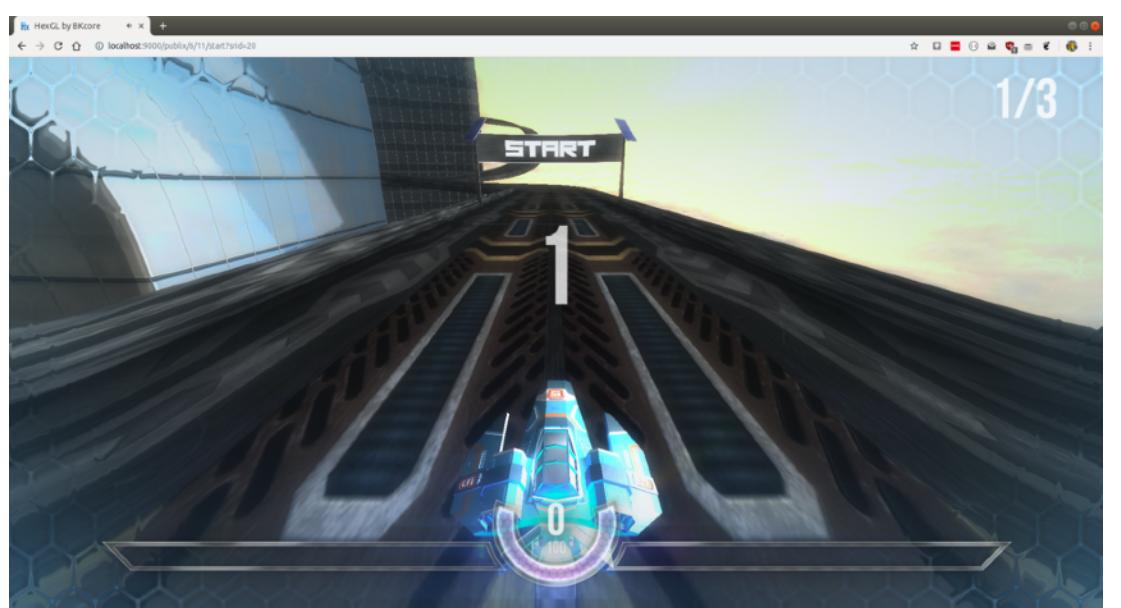
Ethics and privacy

What do we mean by ‘Online studies’?

Any study



that runs in a browser

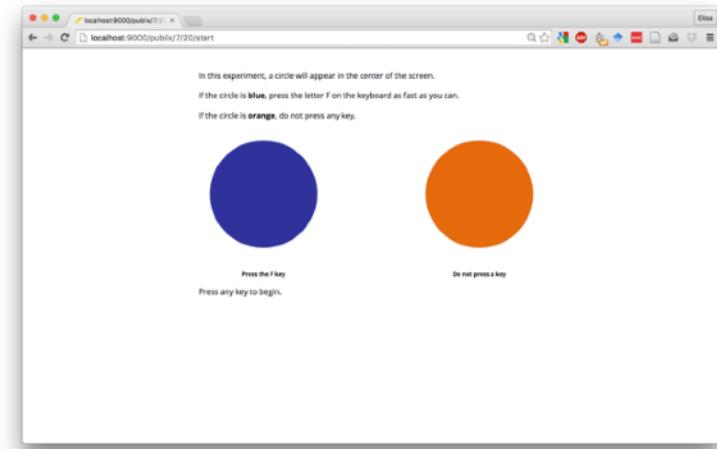


that sends data to a database

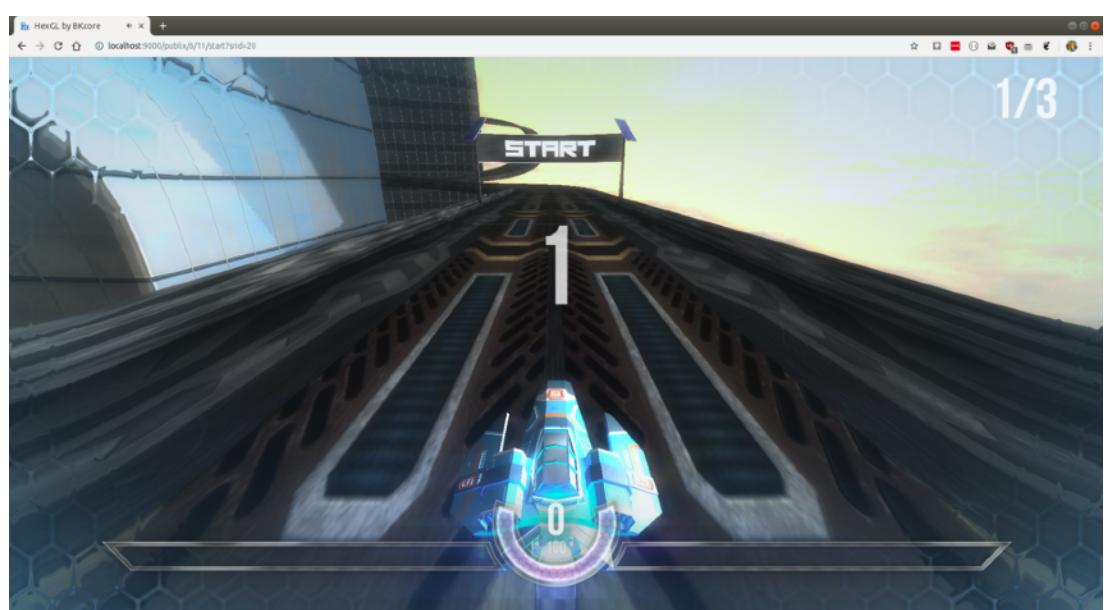


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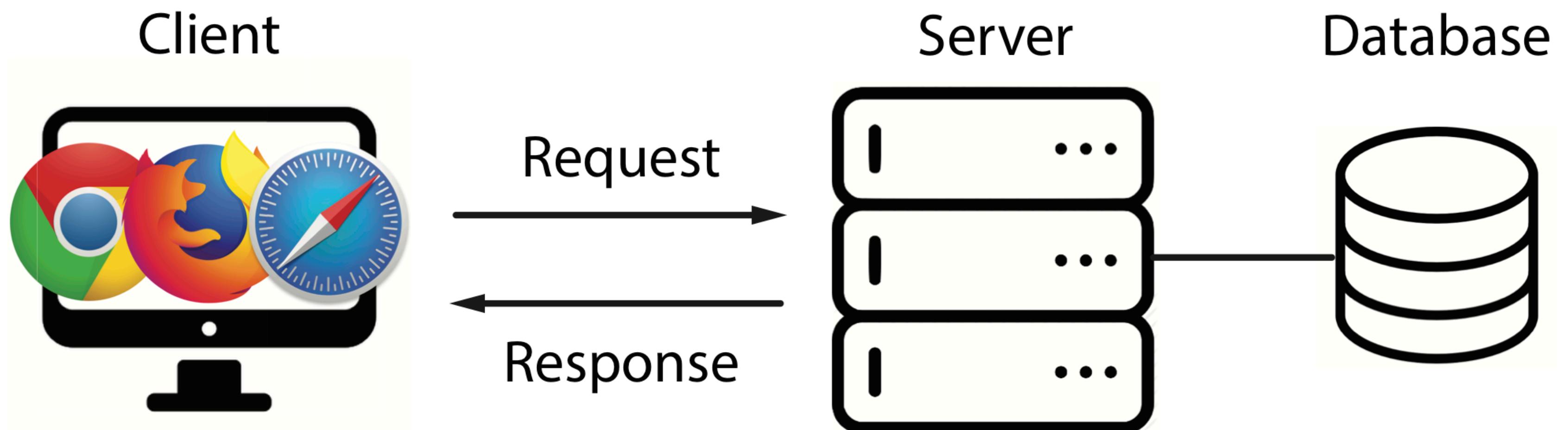


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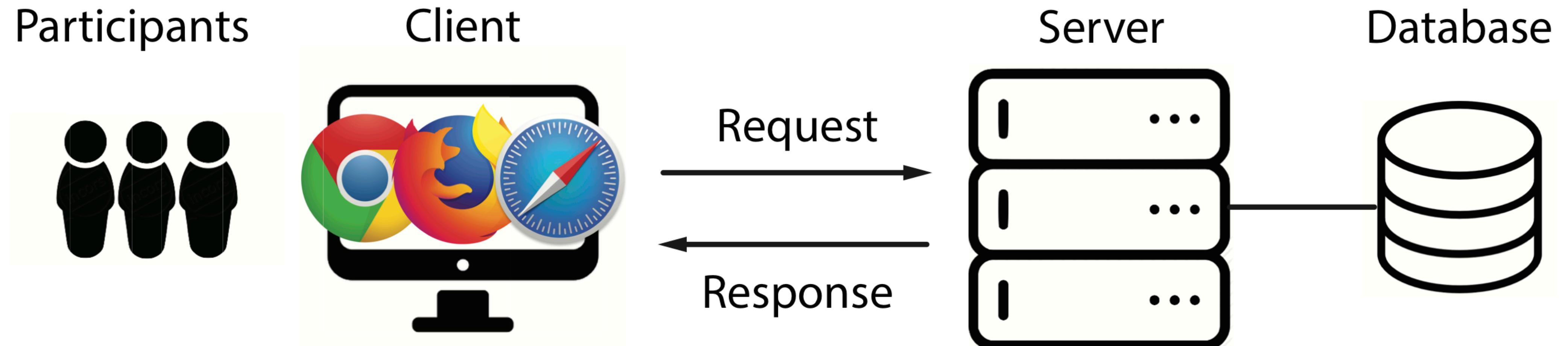


This also applies to lab-based studies running on a browser (more on this later)

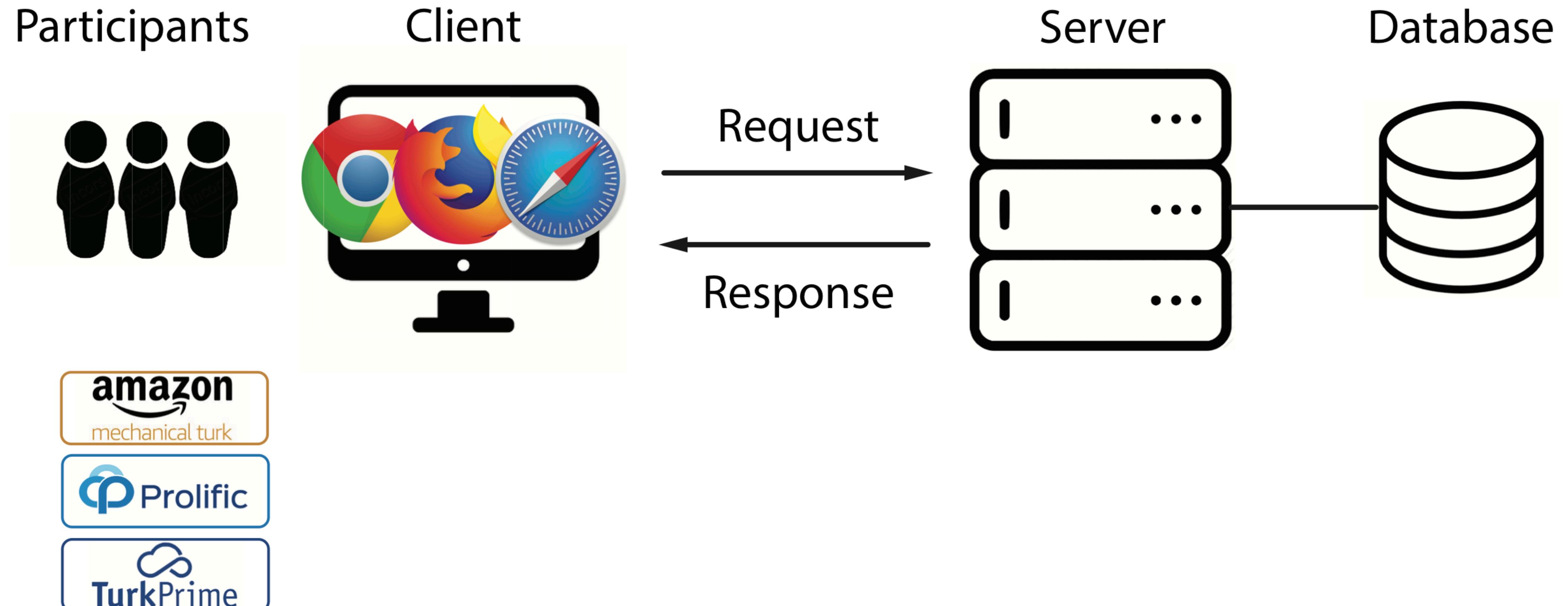
The Internet



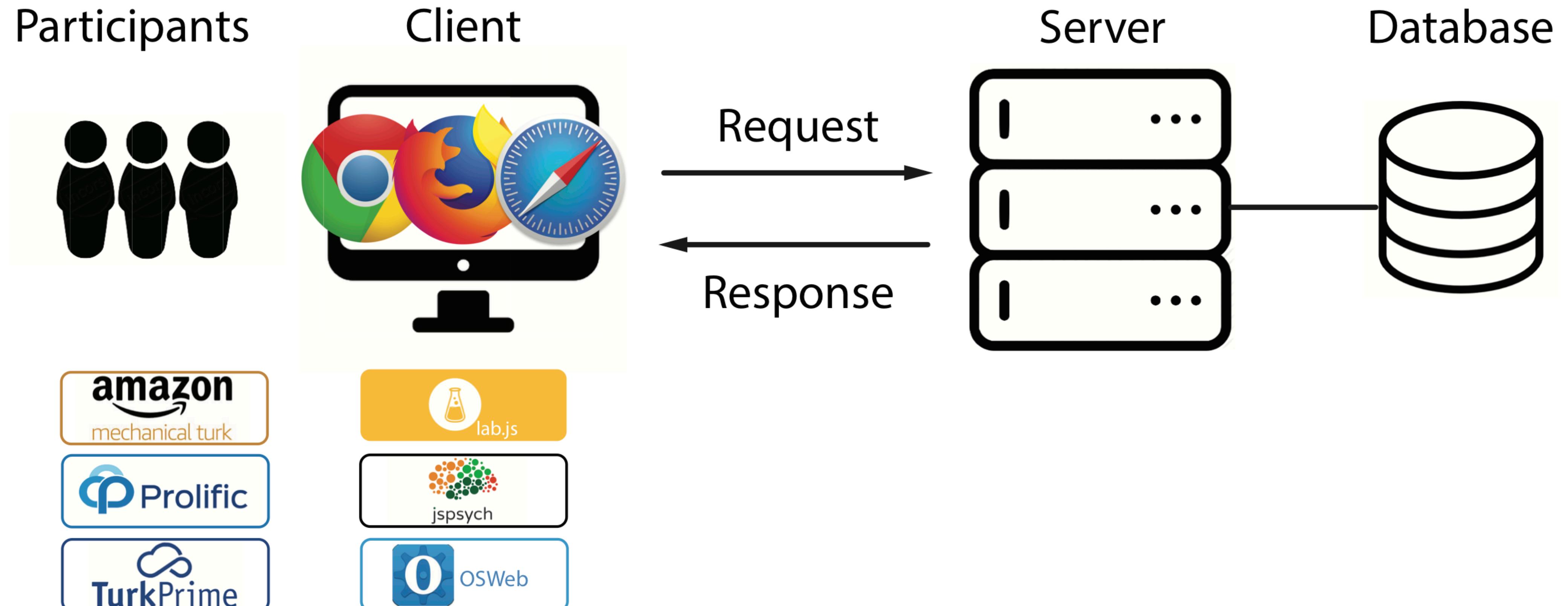
To run a study online you'll need:



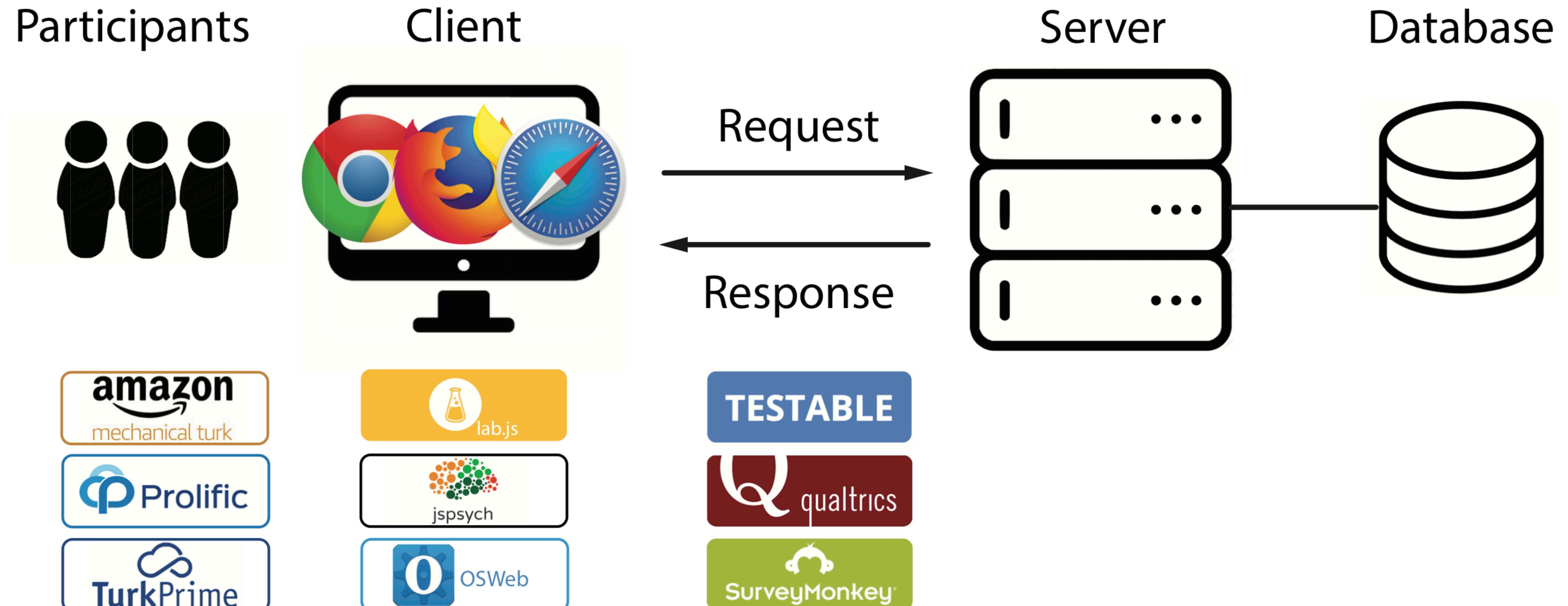
Different tools solve different problems



Different tools solve different problems

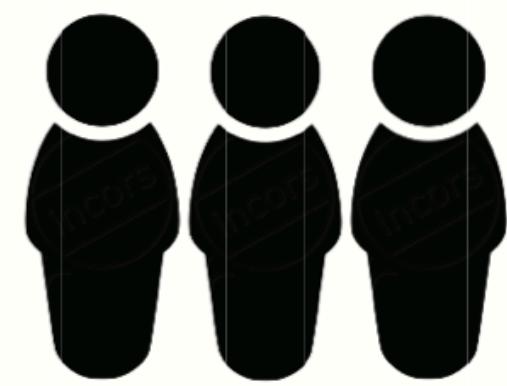


Different tools solve different problems



Different tools solve different problems

Participants

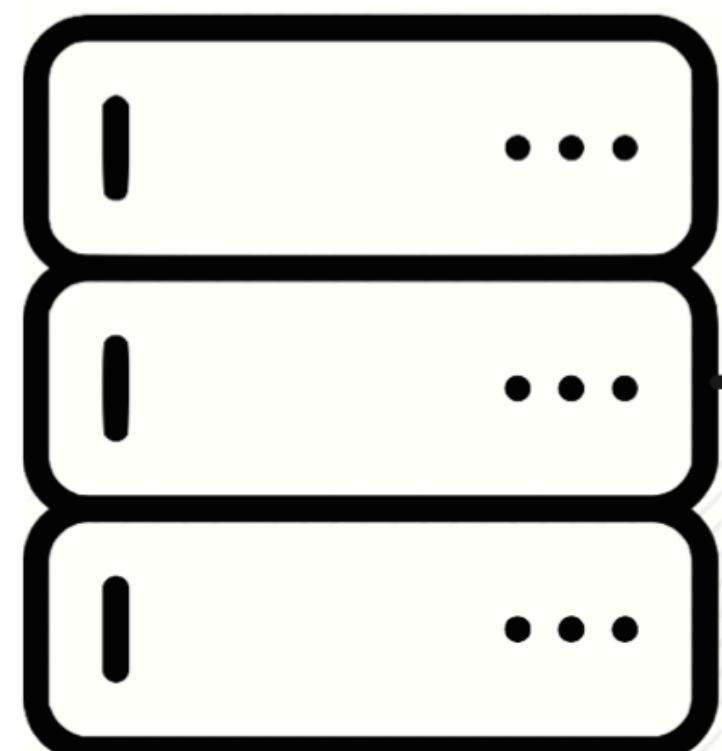


Client

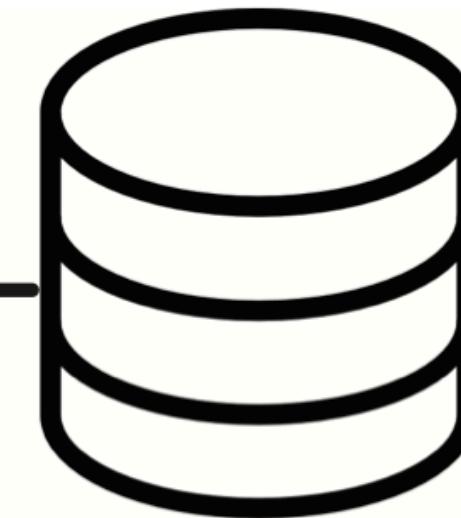


Request
→
← Response

Server



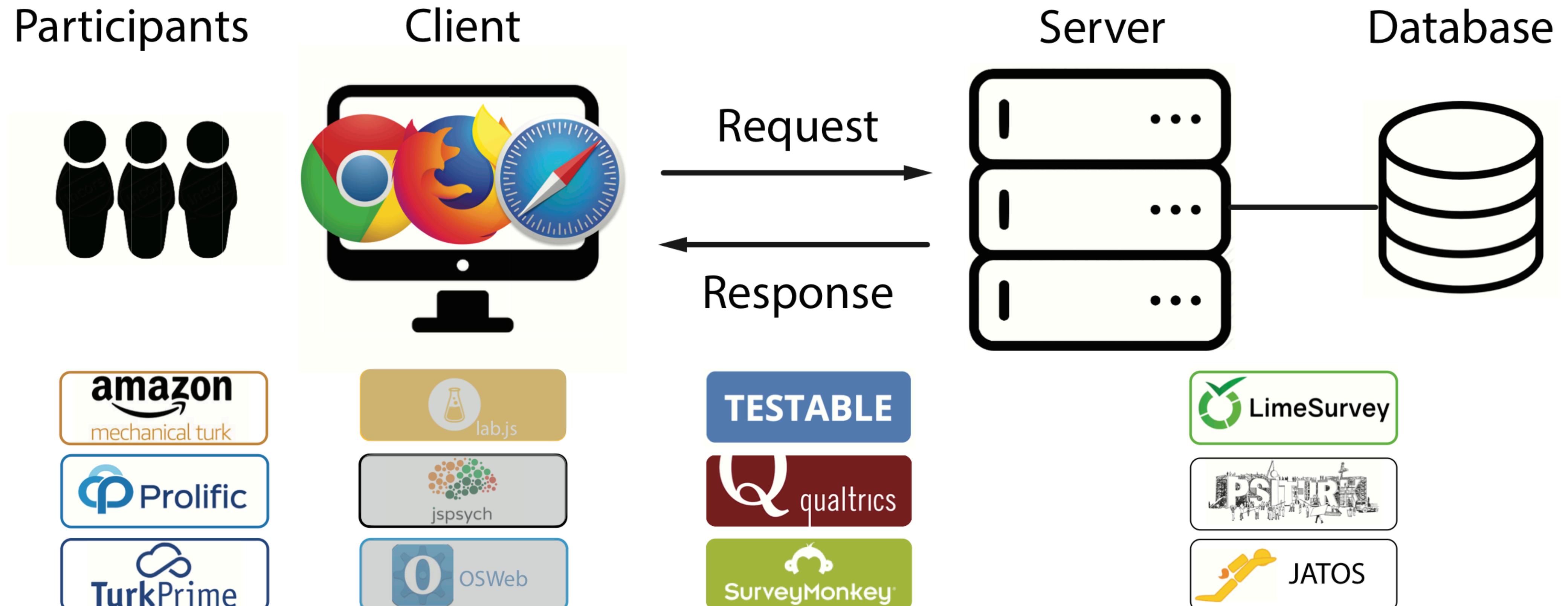
Database



TESTABLE



Different tools solve different problems

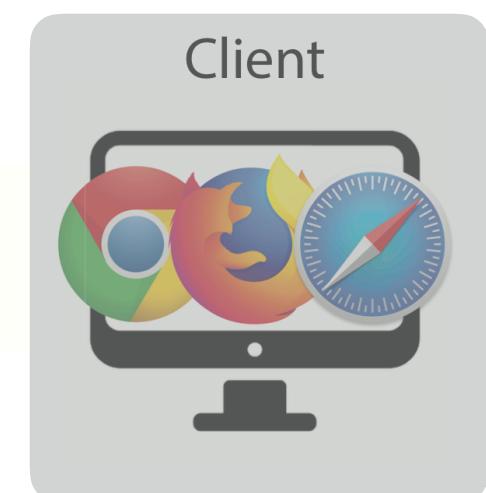
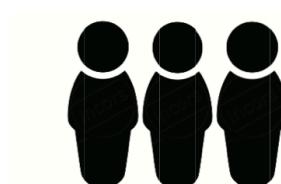


(Client side) Tool comparison



(All of them open source)

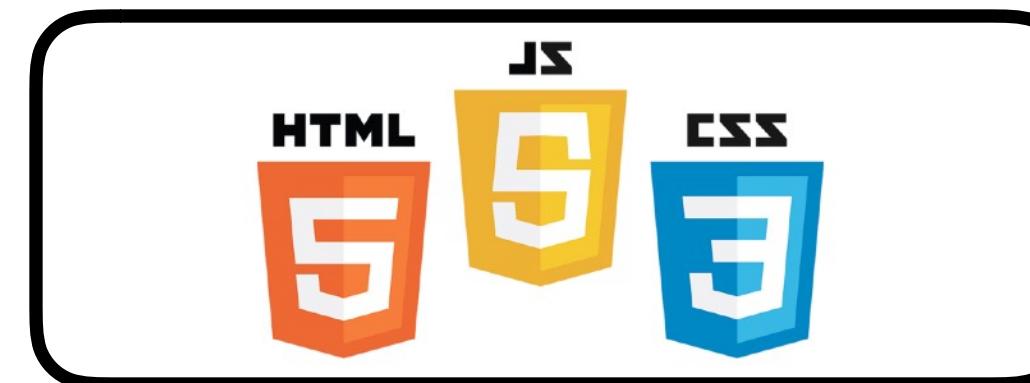
Participants



Server

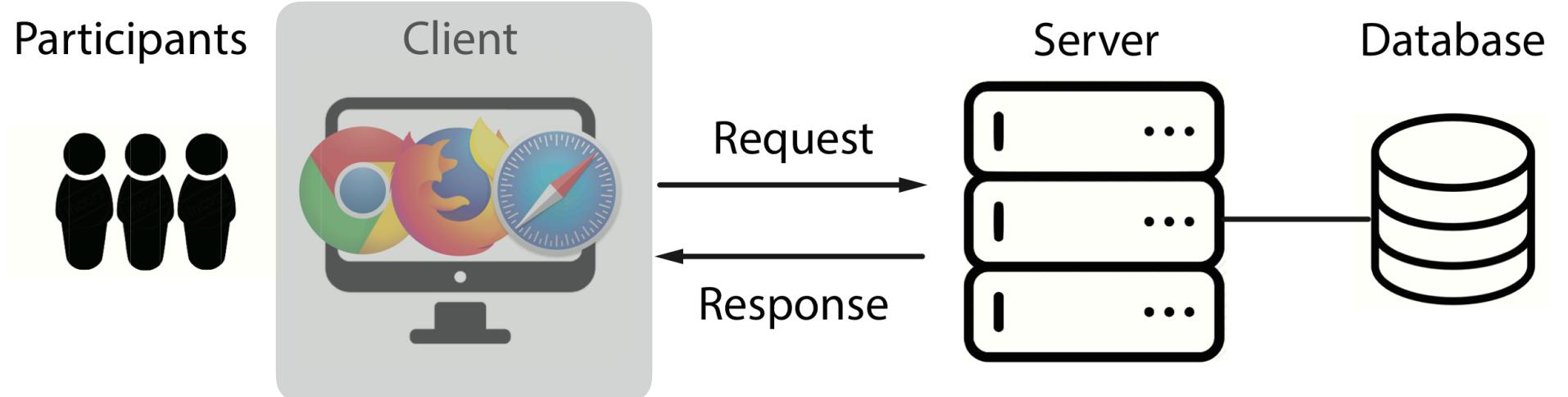
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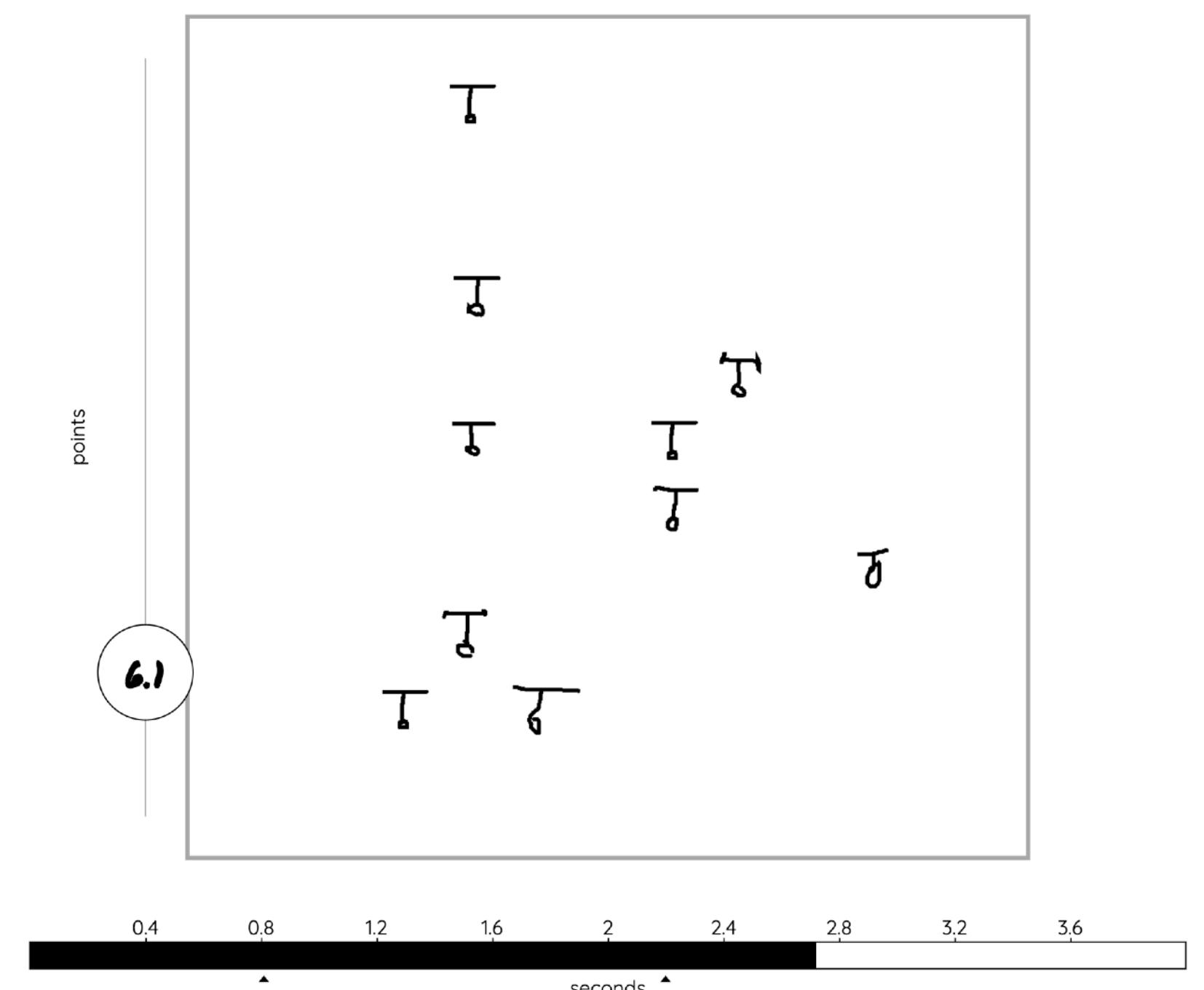


(All of them open source)

The screenshot shows the lab.js interface for creating psychological experiments. On the left, there's a sidebar with options like 'Instruction', 'Stroop task', 'Trial', 'Fixation cross', 'Stimulus' (which is selected), and 'Inter-trial interval'. The main area is titled 'Content' and contains a large text field with the word 'blue' in blue. Below this, there's a question: 'Which color is the word shown in? Please respond using the keys R, G, B and O for red, green, blue and orange.' At the bottom, there's a toolbar with various icons for adjusting stimulus properties.



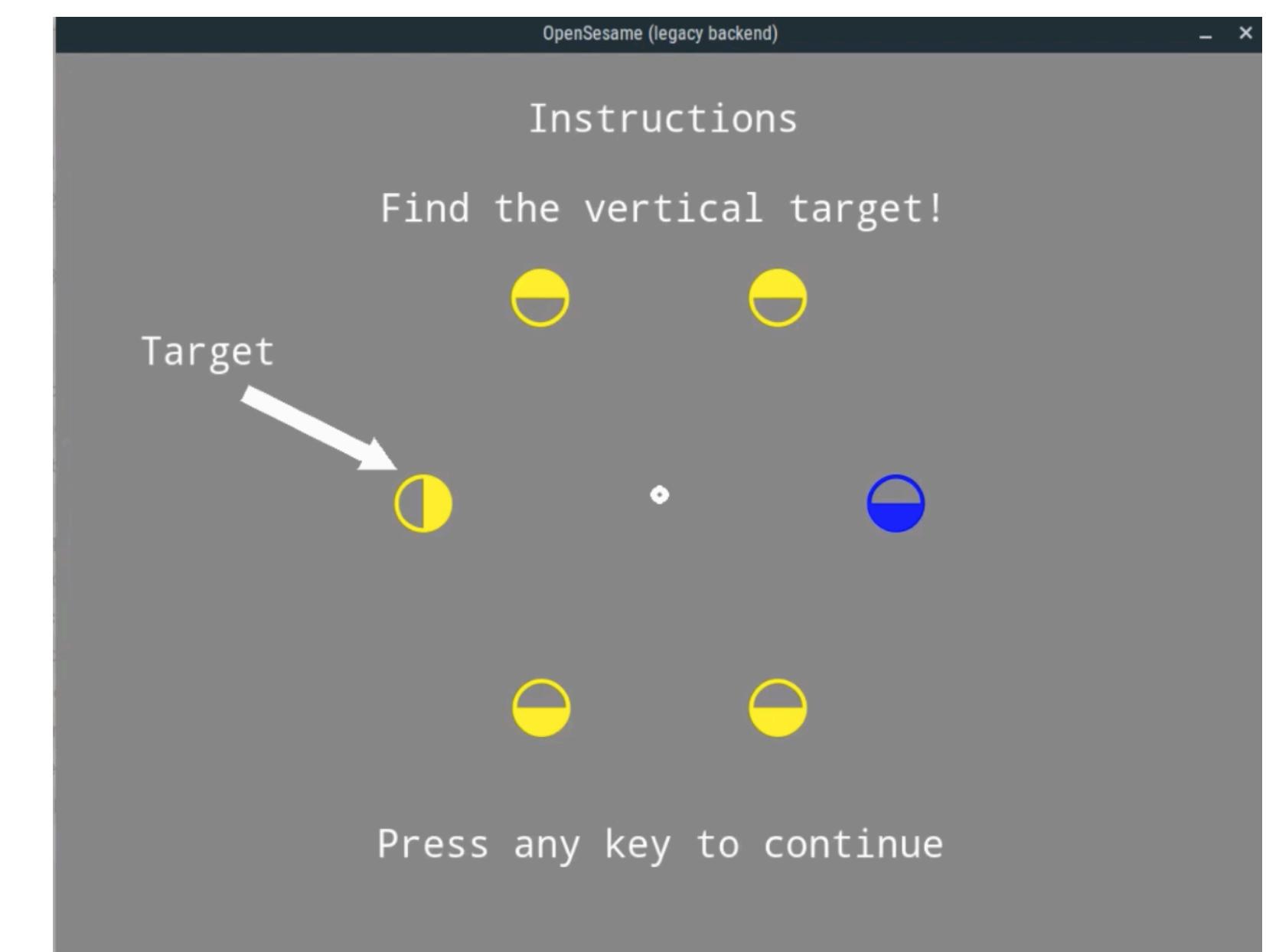
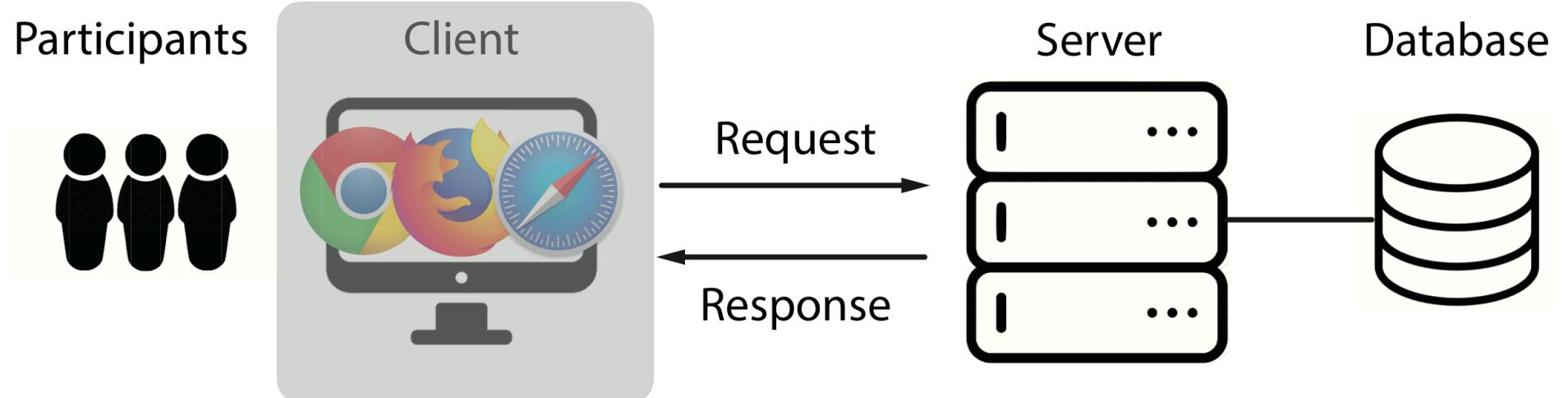
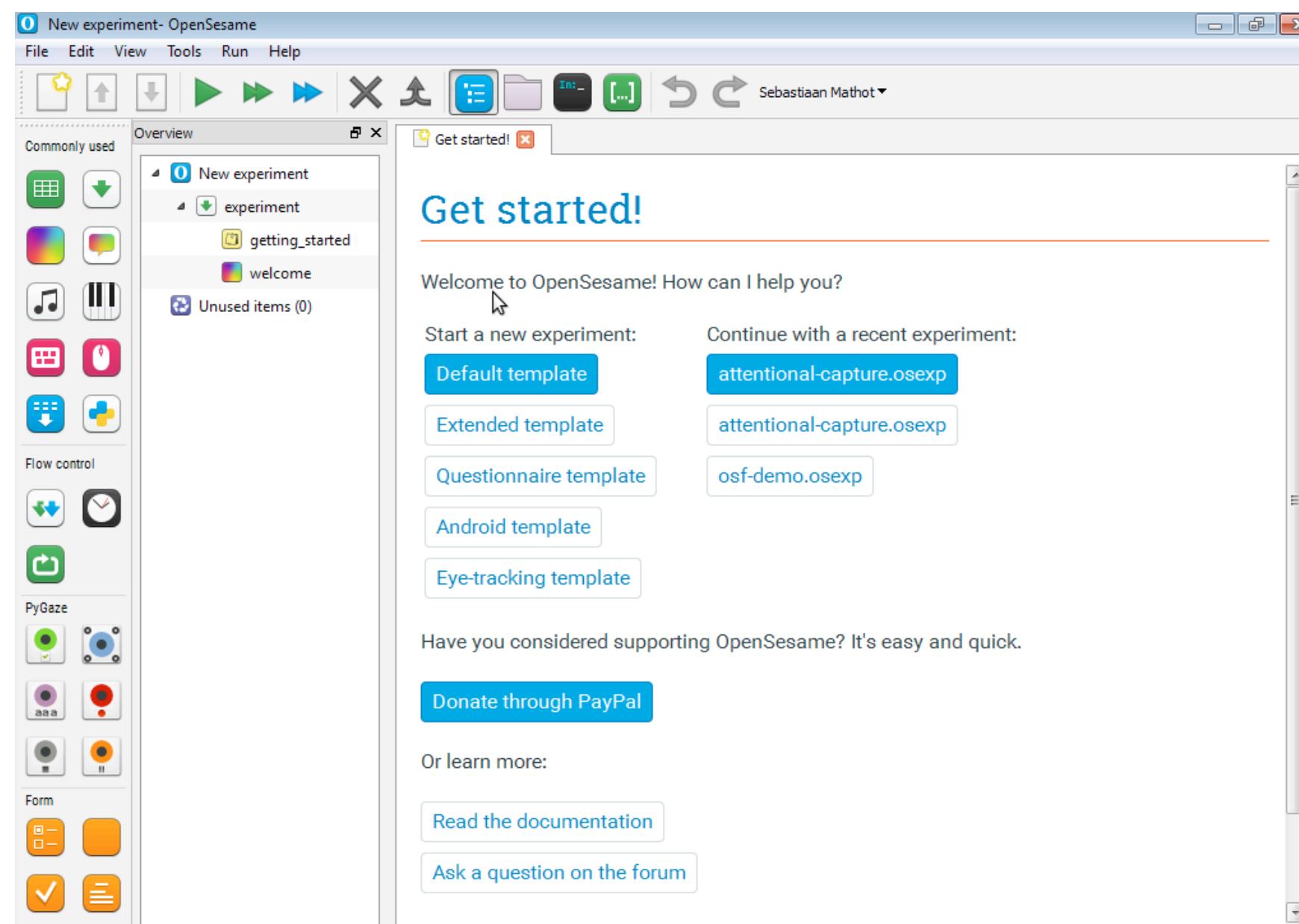
How long (in seconds) will it take you to find the ↗ when mixed with this set of distractors?



(Client side) Tool comparison



(All of them open source)

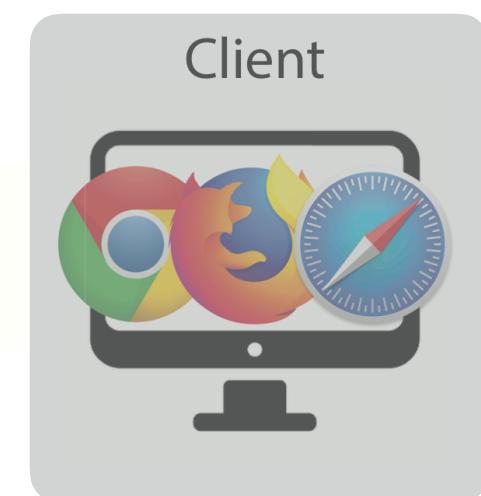
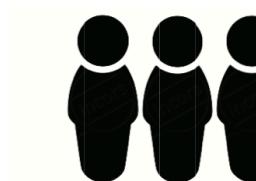


(Client side) Tool comparison



(All of them open source)

Participants



Server



EXPERIMENT START

```

1 function LinkedList() {
2     this.head = null;
3 };
4
5 LinkedList.prototype.add = function(value) {
6     var node = {
7         value: value,
8         next: null
9     };
10    var current;
11
12    if(this.head === null) {
13        this.head = node;
14    } else {
15        current = this.head;
16        while(current.next) {
17            current = current.next;
18        }
19        current.next = node;
20    }
21 }

```

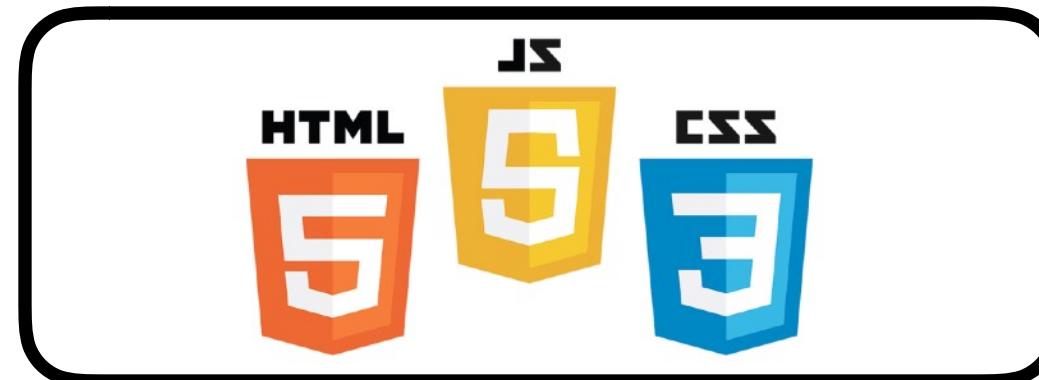
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12    if(this.head === null) {
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14    } else {
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16        while(current.next) {
17            current = current.next;
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20    }
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```

EXPERIMENT END

(Client side) Tool comparison



Great.
(But also, argh!)



Great for surveys and simple studies.



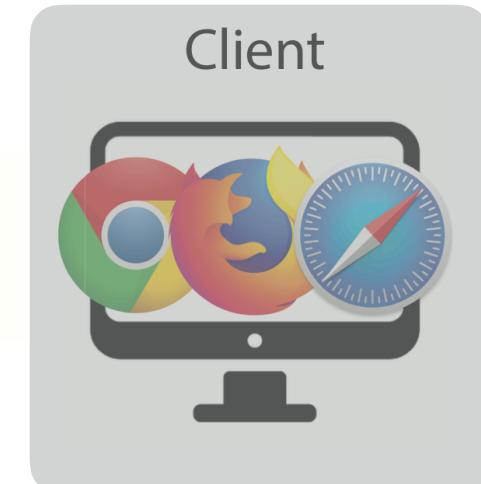
Great for “standard” studies.
Quickly gets complicated otherwise



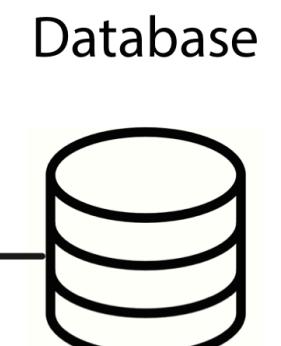
Great for tracing custom stimuli.
Doesn’t (yet) support complex logic

(All of them open source)

Participants



Server



(Client side) Tool comparison



Great.
(But also, argh!)



Great for surveys and simple studies.



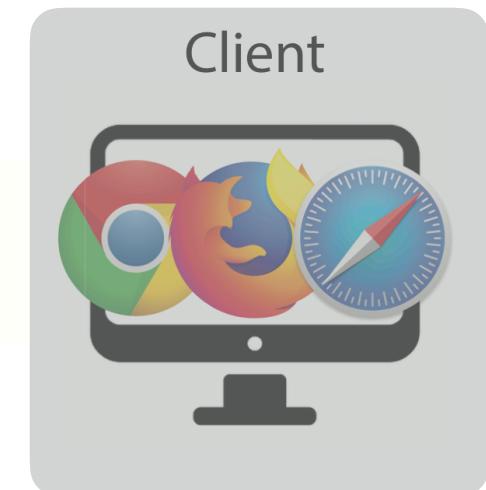
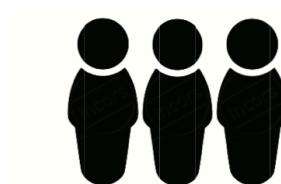
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Participants



Server

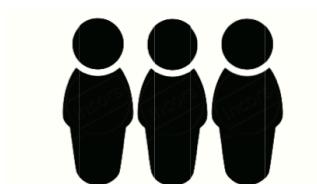
Database

(Server-side) Tool comparison

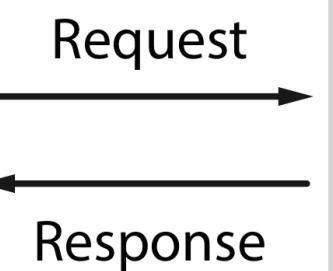


Great.

Participants



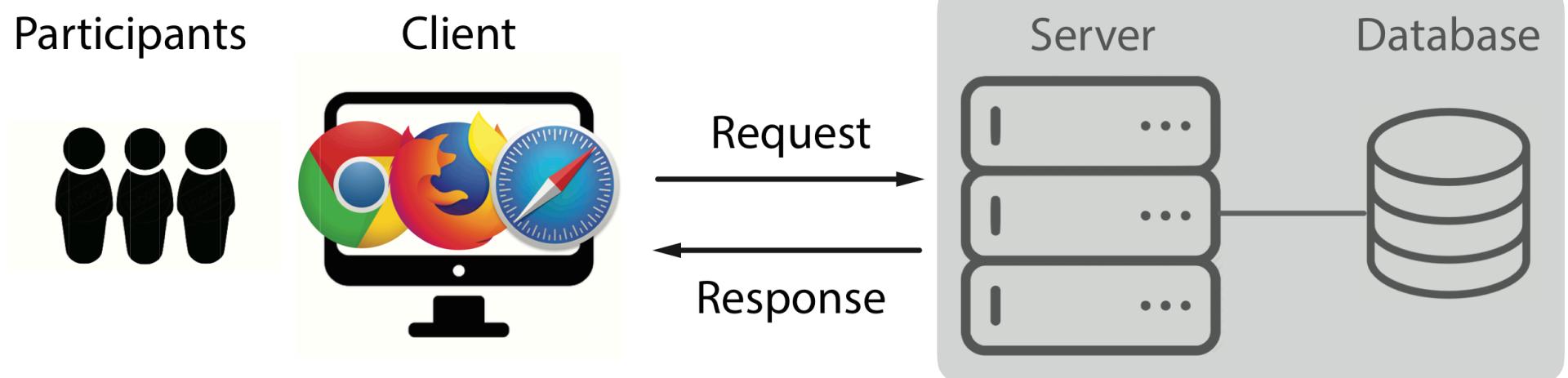
Client



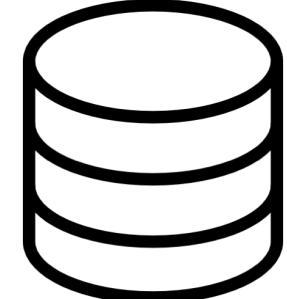
Server

Database

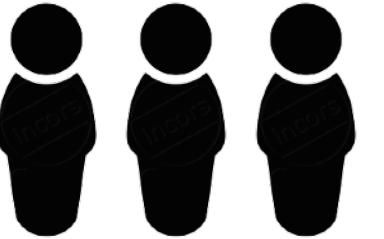
WWW-based testing has specific challenges



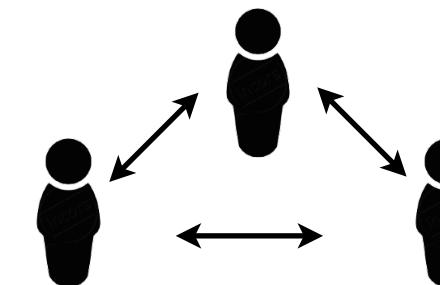
Great.



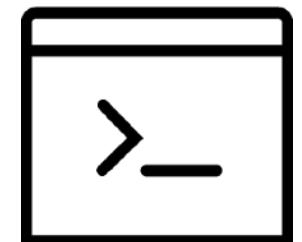
Store data



Manage participants



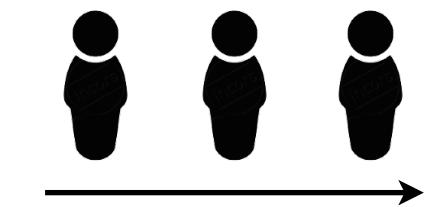
Group studies



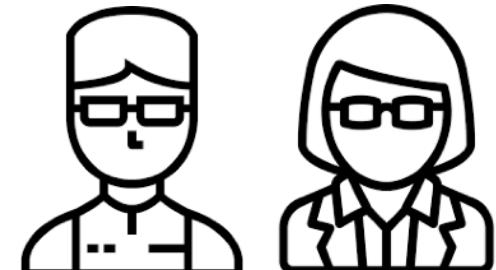
Access data



Store data responsibly



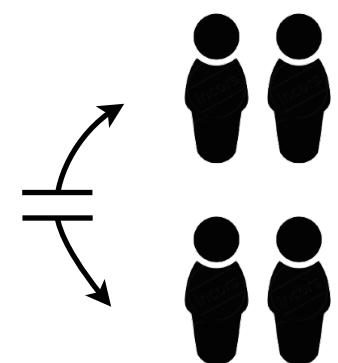
Longitudinal designs



Access your data



Identify to pay participants



Between-subjects designs

WWW-based testing has specific challenges



Great.

Participants



Client



Server



Database



A screenshot of a web browser showing the JATOS study management interface. The left sidebar lists various study components: Arithmetics with Touch or Mouse Tracking, Binocular Rivalry, Binocular Rivalry - CSS hands-on, Bistable Perception, Browser Info and Worker Tracking, Change Blindness, Clock Drawing, Clock Drawing - jsPsych hands-on, Metacognition Carpenter, and videoStudy. The main content area shows a study titled "Metacognition Carpenter" with four tasks listed: 10 Consent Form, 11 Assign Conditions, 21 PrePost_allTasks, and 13 Training. Each task has a "Run" button, a "Results" button, a "Properties" button, and a "More" button. The top navigation bar includes links for "JATOS local", "New Study", "Import Study", "User Manager", "Admin", and "Logout".

WWW-based testing has specific challenges



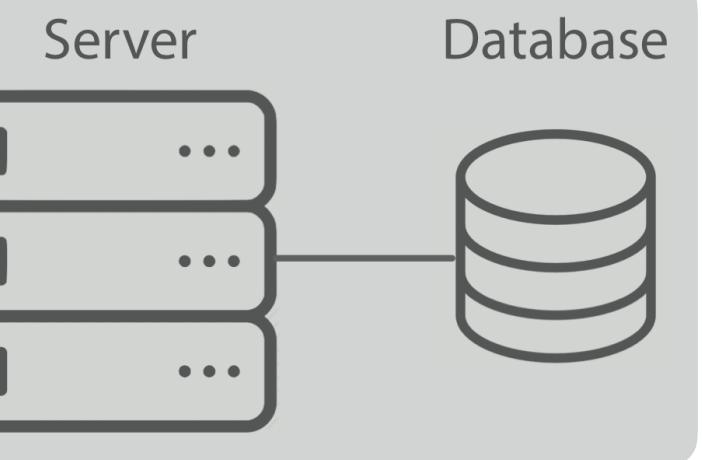
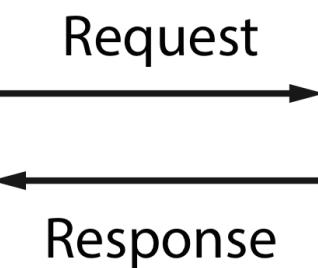
Great.



Participants



Client



Papers that used JATOS are published in:

Neuron

Cognition

Frontiers in Psychology

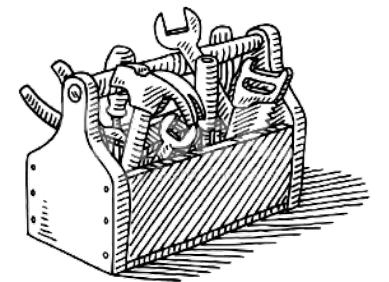
Psychological Research

Developmental Psychology

Psychonomic Bulletin & Review

Journal of Cognitive Neuroscience

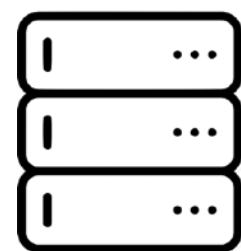
Roadmap



Tools available



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Serving the Internet



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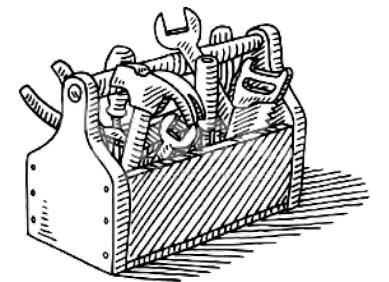


What is (im)possible online: timing and participants

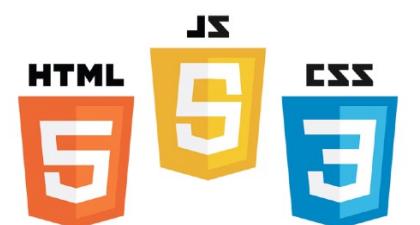


Ethics and privacy

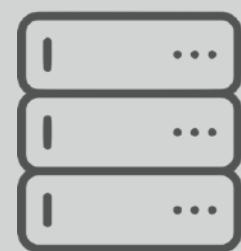
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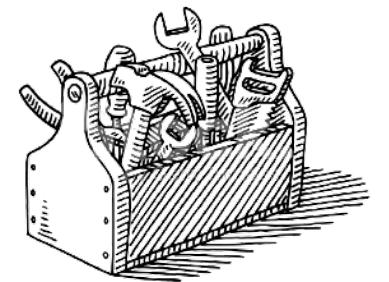


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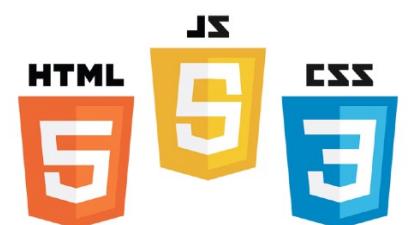


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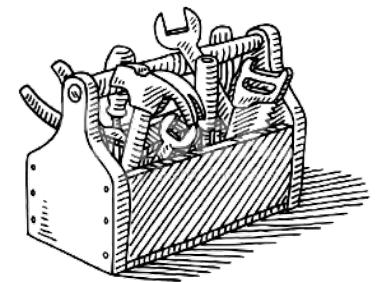


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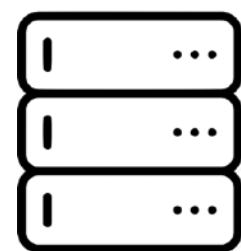
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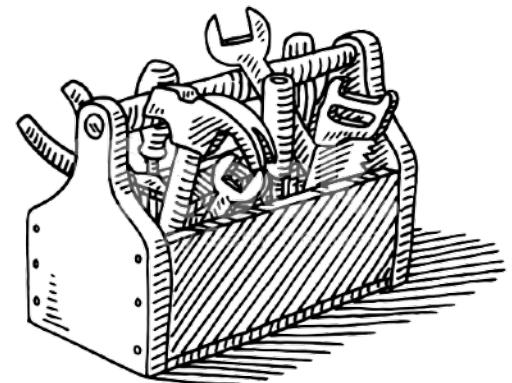
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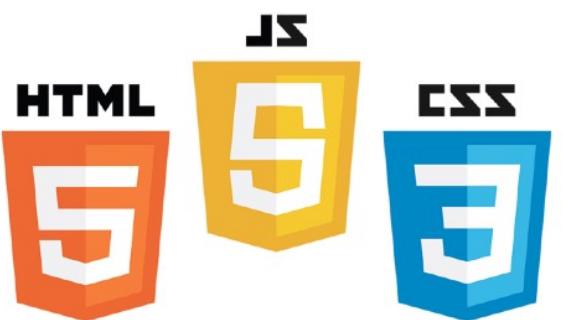
Tools available



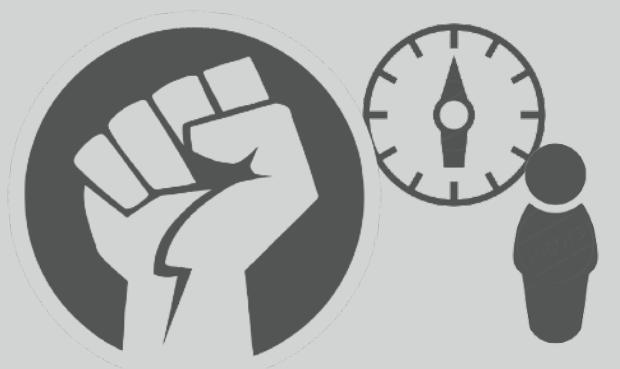
Analyzing data collected online



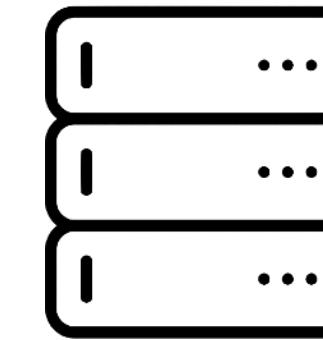
Coding with web-technologies



What is (im)possible online:
timing and participants



Serving the Internet



Ethics and privacy



FAQ1: Timing



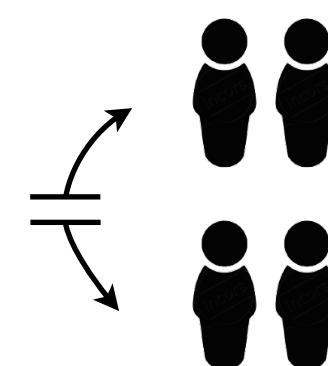
GOOD NEWS

In 2014 JavaScript (JsPsych) RTs were systematically slower but not more variable than Psychtoolbox's



BAD NEWS

Different browsers/systems may mean different systematic delays!



JavaScript in the browser can achieve sub-millisecond precision

```
timeStamp = performance.now();
```

“Spectre” led to precision reduction
($5\mu\text{s} \rightarrow 20\mu\text{s}$ in Firefox)

FAQ1: Timing



GOOD NEWS

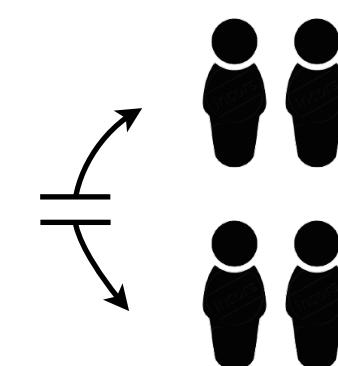
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berlin2020.jatos.org/checkJitteredTimes.html



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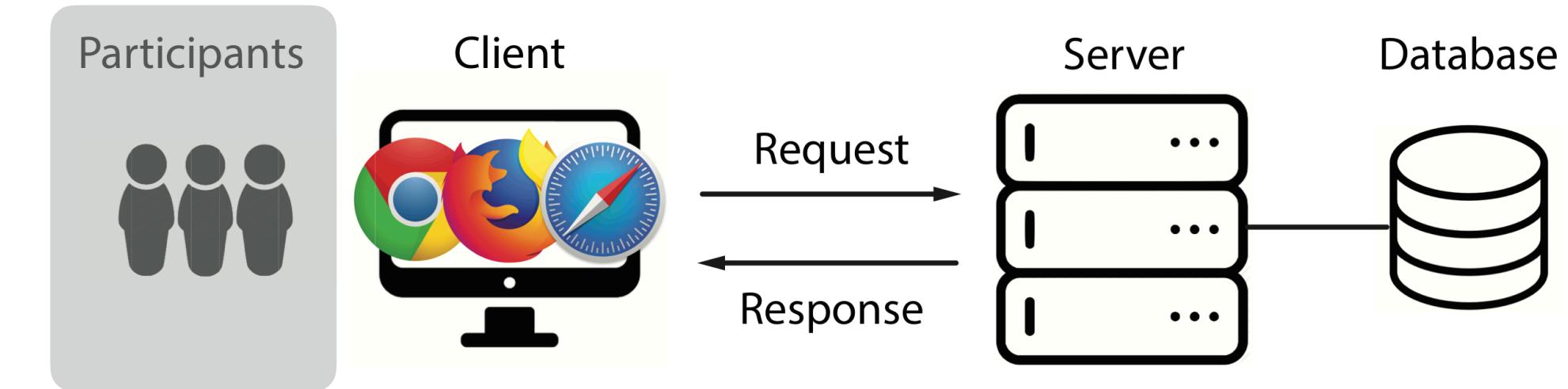
```
timeStamp = performance.now();
```

“Spectre” led to precision reduction
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FAQ2: Participants



Works



Compared to CCES: younger, longer educated, equally employed.

Huff & Tingley, Research & Politics (2015).

<http://demographics.mturk-tracker.com>

Difallah et al., Proceedings of WSDM (2018)

Quicker to sign up, less likely to drop out better paid assignments.
Data quality is unaffected.

Crump et al., PLoS ONE (2013)

Are sometimes full time workers, so consider guidelines for job satisfaction.
Workers will hold you accountable as a "Requester"

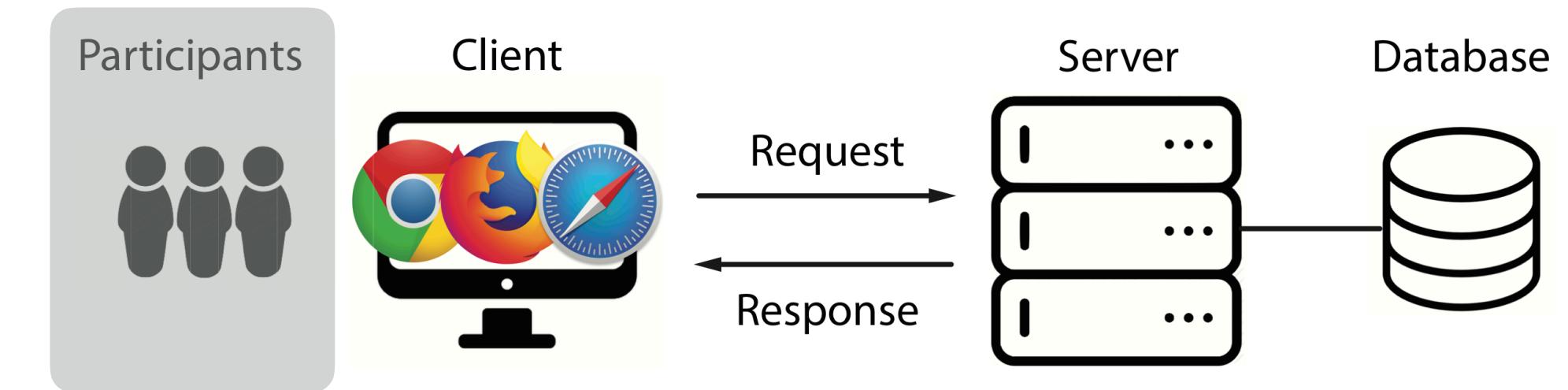
Brawley & Pury, Computers in Human Behavior (2016)

FAQ2: Participants



Works better

- Basic demographic variables
- Education
- Family & relationships
- General health
- Geographic variables
- Interests / hobbies
- Languages
- Mental health
- Participation on Prolific
- Physical health
- Political, religious, and personal beliefs
- Shopping and personal finance
- Socioeconomic variables
- Work



- Basic demographic variables
 - Age
 - Handedness
 - Nationality
 - Ethnicity
 - Sex
 - Gender identity
 - Sexual Orientation
- Custom Screener
 - Custom Whitelist
 - Custom Blacklist

- Participation on Prolific
 - Approval Rate
 - Previous Studies
- Family & relationships
 - Children
 - Number of children
 - Pregnancy
 - Year of birth of first child
 - Year of birth of 2nd child
 - Children and technology
 - Pregnancy (partners)
 - Long distance relationship
 - Trying to conceive
 - Number of romantic partners
 - Living with family

FAQ3: Data quality



In your experiments:

- Give short instructions, ask questions about them
- Give feedback on task performance / timing
- Include catch trials
- Consider asking: Did you honestly try?

In your data collection and analysis:

- Watch out for systematic dropout effects in between-subjects designs
- Record the browser and system

Partly from Crump et al., PLoS ONE (2013)

FAQ3: Data quality



In your experiments:

- Give short instructions, ask questions about them
- Give feedback on task performance / timing
- Include catch trials
- Consider asking: Did you honestly try?

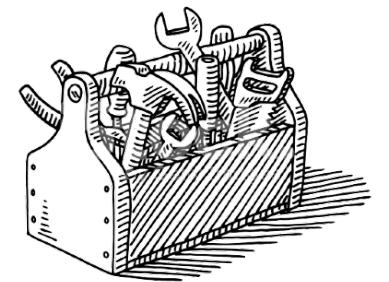
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berlin2020.jatos.org/browser-info-and-worker-tracking.html

Partly from Crump et al., PLoS ONE (2013)

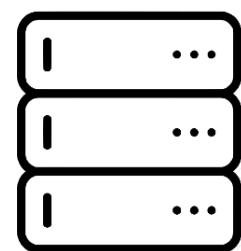
Roadmap



Tools available



Coding with web-technologies



Serving the Internet



Analyzing data collected online



What is (im)possible online: timing and participants



Ethics and privacy

Data privacy and ethics



Store sensitive (all?) data privately.
Data accessible from the HTML/JS are public!

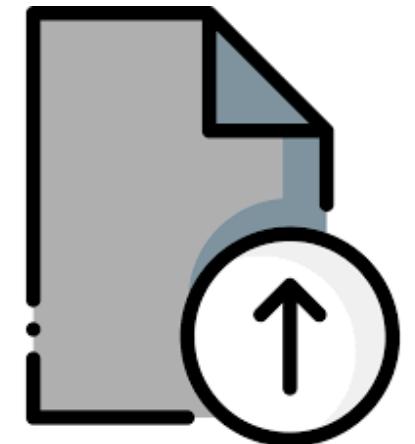


Tell participants what you store in a study.
Allow participants to delete all their data if they quit

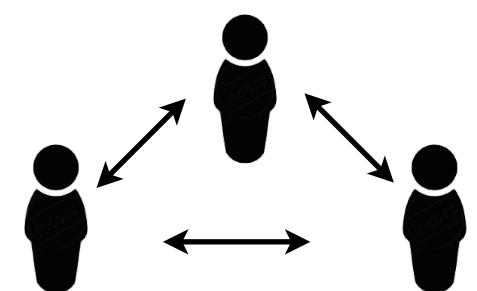


Tell people if you store cookies in their computers
General Data Protection Regulation
(GDPR or “European cookie law”)

JATOS upcoming features



Upload/Download arbitrary files (audio, video, images, etc)

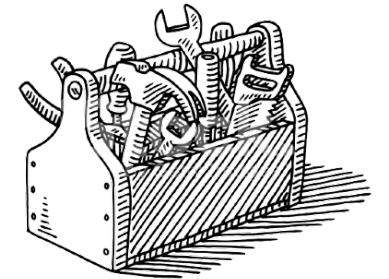


Group/Longitudinal GUI



Your wishes!

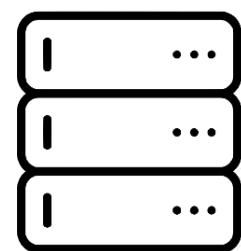
Recap



Always use the appropriate tool.



HTML/CSS/JS is really powerful.



It's easy (sometimes free) to serve the internet. Read our docs! (www.jatos.org)



You'll typically store text data. (File upload feature is coming soon.)

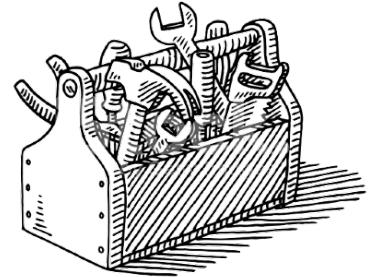


Timing is good for most purposes. Participants, with some care, are good too.

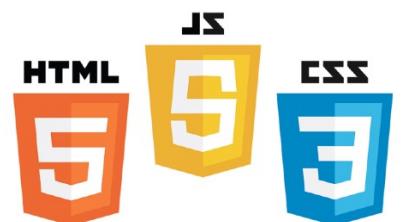


Be mindful of subjects' privacy.

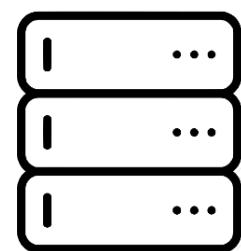
Thank you! Any questions?



Always use the appropriate tool.



HTML/CSS/JS is really powerful.



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Timing is good for most purposes. Participants, with some care, are good too.



Be mindful of subjects' privacy.