

anatomy of a modern web application

Christian Cito / 16.06.2023

twitter.com/chrcit

github.com/chrcit

slides:

<https://christiancito.com/16-06-23-anatomy-of-a-modern-web-application.pdf>

who am i?

- web dev since 2011
- Jürgen's first student
- went to a technical high school
- started freelancing while in school
- worked @ XING for a few years
- love doing side projects

zeitimpuls shortfilm festival

zeitimpuls shortfilm

Programs Filmmakers Questions & Research

[Name Missing] View profile

[BACK TO THE PROGRAMS](#)



Clichés fall out of the windows of Shanghai, a glance out of the windows at the Ivory Coast reverses time and all genders dance across continents to present their normalities. The borders and norms are threatened to relive history and undergo a defenestration however this time in Vienna.

Films



Player -Linn da Quebrada

With a trans women choir, the clip records a prayer song recorded in an abandoned church in São Paulo, Brazil. In the current context of Brazil where trans women die daily, in the clip they unite and sing the request "stop burning us, stop killing us". On the day of recording the clip, the police stopped recording due to homophobia with trans women, without arguments, they just said that "they didn't want us to record". This clip is more than a music video, it is an act of struggle

DE EN

content aggregator for a streamer

Hasan Hub

Made by @chrcit Buy me a coffee

< 3min 3-15min
15-30min > 30 min

React Andrew Tate
Ben Shapiro TikTok
Trump Elon Musk
Hogwatch Joe Rogan
Steven Crowder
Kanye West Twitch
Jubilee Police
Ludwig Ahgren
AustinShow
Tucker Carlson
Valkyrae
Jordan Peterson
Adin Ross JCS

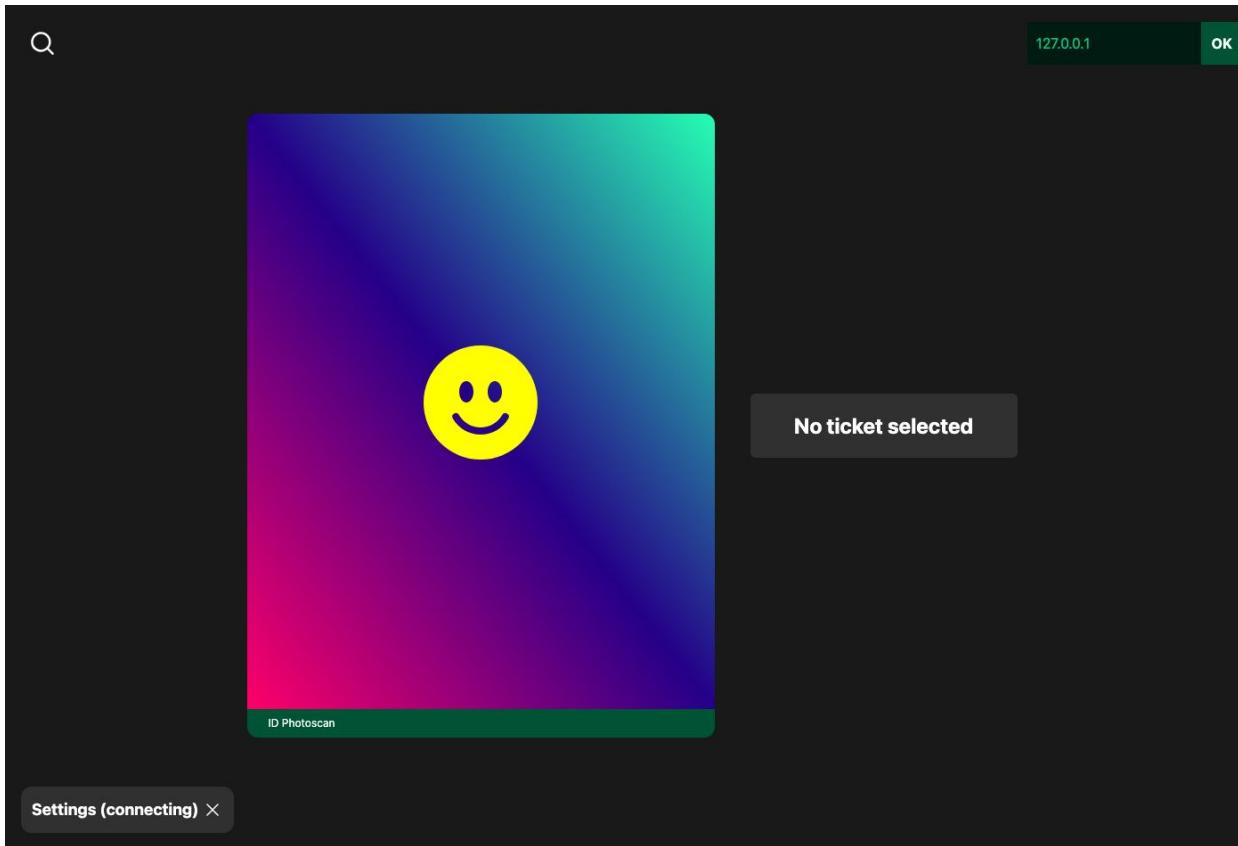
Latest videos

25 of 15031 Videos shown

Date Popularity Asc Desc

Thumbnail	Title	Published	Views	Category
	Conservatives CRYING over Trump Prison Sentence Hasanabi reacts	6/13/2023	10K views	Hasanabi Productions
	Conservative Women's Conference is AWFUL Hasanabi Reacts	6/13/2023	28K views	Hasanabi Moments
	Austin Shows Up 2 The HasanAbi Broadcast	6/13/2023	777 views	Hasanabi's Witness
	Is Reddit OVER?	6/13/2023	6.6K views	AustinShow
	"You Didn't Use To Care About This!"	6/13/2023	19K views	AustinShow
	"You Didn't Use To Care About This!"	6/13/2023	123K views	AustinShow

check-in app for hausgemacht



grocery price tracker

preismonitor.at

Produkte Spar Billa Hofer

[Twitter](#) [Facebook](#) [Instagram](#)

Startseite

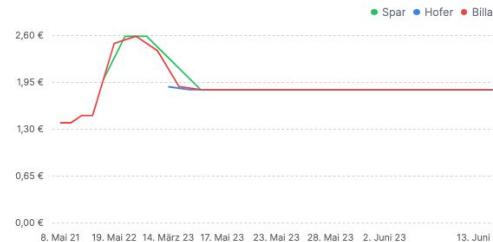
Produkte (133)

Suche

Suchen

Butter (250g)

Bei komplett identen Preisen wird nur 1 Linie angezeigt.

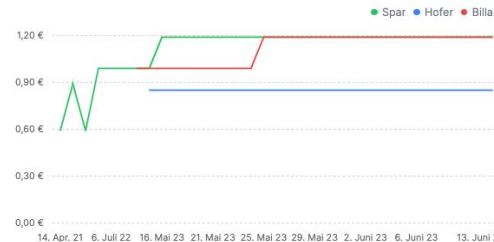


Tag	Spar	Hofer	Billa
13. Juni 23	1,85 €	1,85 €	1,85 €

Billa:
Clever Österreichische Teibutter Spar:
S-BUDGET_Butter Hofer:
MILFINA Butter_Standard

Mehl (1kg)

Bei komplett identen Preisen wird nur 1 Linie angezeigt.



Tag	Spar	Hofer	Billa
13. Juni 23	1,19 €	0,85 €	1,19 €

Spar:
SPAR_Weizenmehl glatt_Type W 700 Billa:
BILLA Mehli Glatt Hofer:
HAPPY HARVEST Weizenmehli Glatt Type 480 1kg

Zucker (1kg)

Eier (10 stk)

mitentscheiden.at

SPÖ Vorsitzbefragungs-Kabine

powered by  JUNGE GENERATION
IN DER SPÖ WIEN

Finde heraus welche*r Kandidat*in für die SPÖ
Vorsitzbefragung 2023 am Besten zu dir passt.

Die Vorsitzbefragungs-Kabine ist eine Initiative der Jungen Generation Wien.

→ Kabine starten



mitentscheiden.at

- initiative by the youth wing of the SPÖ
- 41 questions answered by all 3 candidates
- questionnaire which matches you with the candidates
- modelled after wahlkabine.at
- from idea to launch → 3 weeks

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questionnaire:

SPÖ Vorsitzbefragungs-Kabine

Arbeit & Soziales

Frage 5:
Soll ein bundesweites Immobilien-Spekulationsverbot gesetzlich verankert werden?

[Überspringen](#)

Ich stimme:

Das ist mir:

result:



comparison:

SPÖ Vorsitzbefragungs-Kabine

powered by  JUNGE GENERATION IN DER SPÖ WIEN

Arbeit & Soziales

Frage 1:
Soll die 30 Stundenwoche gesetzlich festgelegt werden?

 Hans-Peter Doskozil

▼ Zusätzliche Information

Ich stehe für die Einführung des Mindestlohnes von 2.000 € netto. Die ArbeitnehmerInnen sollen zuallererst angemessen für ihre Leistungen entlohnt werden. Wenn dieser Schritt geschafft ist, kann man die Verkürzung der Arbeitszeit diskutieren.

 Pamela Rendi-Wagner

► Zusätzliche Information

 Andreas Babler

► Zusätzliche Information

Arbeit & Soziales

Frage 2:
Soll ein Mindestlohn gesetzlich festgelegt werden?

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shareable:

mitentscheiden.at

MEIN ERGEBNIS

Rank	Candidate	Match (%)
1.	Andreas Babler	76%
2.	Hans-Peter Doskozil	67%
3.	Pamela Rendi-Wagner	58%

JUNGE GENERATION
IN DER SPÖ WIEN



open graph image:



Jörg R. Mayer
@JoergRMayer

...

Die Fragen sind natürlich, wie zu erwarten, ein Sammelsurium linksradikalen Wahnsinns. Man hat die Wahl zwischen den verschiedenen Geschwindigkeiten, in denen Österreich zugrunde gerichtet werden soll.

[Translate](#) [Tweet](#)

Mein Ergebnis

Finde heraus welche*r Kandidat*in am Besten zu dir passt!

Rank	Candidate	Match (%)
1.	Pamela Rendi-Wagner	54%
2.	Hans-Peter Doskozil	43%
3.	Andreas Babler	26%

JUNGE GENERATION
IN DER SPÖ WIEN

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Mein Ergebnis bei der Vorsitzbefragungs-Kabine | SPÖ Vorsitz Vorsitzbefragu...
Mein Resultat: Pamela Rendi-Wagner: 54%, Hans-Peter Doskozil: 43%,
Andreas Babler: 26%

mitentscheiden.at – results

~27.500 people filled out the questionnaire

~550 peak concurrent visitors

~400.000 impressions on Twitter

mitentscheiden.at – results

PULS 24 POLITIK

Heute 22°C, Wien E-Paper L

MeinBezirk.at Nachrichten Leben Fotos & Videos Veranstaltungen Jobs Marktplatz Community

Mitglieder. In Vorarlberg mit einer gleich vielen Einwohnern wie dem Burgenland gibt es nur 1.100 SPÖ-Mitglieder. Im Schnitt sind sie rund 63 Jahre. Rund 9.000 Mitglieder kamen im Zuge der Vorsitzwahl neu hinzu.

370 Postings



41 Fragen kann man in der Wahlkabine beantworten – auch ohne Mitglied zu sein.
Foto: Heribert Corn

41 Fragen in der Wahlkabine

Soll die 30-Stunden-Woche gesetzlich festgelegt werden? 41 Fragen zu politischen Positionen und strukturellen Fragen der SPÖ hat die Junge Generation der SPÖ den Kandidaten und der Kandidatin für den Vorsitz gestellt. Seit Sonntag soll ihre Wahlkabine auf [mitentscheiden.at](#) Orientierung bieten. (Oona Kroisleitner, Katharina Mittelstaedt, 24.4.2023)

PULS 24 Live

UKRAINE: Liveblog TRENDING: SPÖ-Neustart EMPFEHLUNG: WildUmstritten PODCASTS: PULS 24-Talks

Lesen Sie die Geschichten hinter den Bildern Die Presse am Sonntag Jetzt „Die Presse am Sonntag“ 6 Monate lesen und nur 2 Monate zahlen.

KURIER

MeinBezirk.at Ukraine Politik Chronik Wirtschaft Sport Wissen Stars Kultur MEHR

DER STANDARD

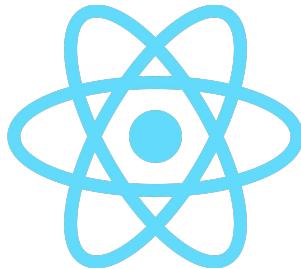
1.255 Postings



Der knappe Sieg bei der Mitgliederbefragung war für Burgenlands Landeschef Hans Peter Doskozil am Ende nicht mehr als eine erste Etappe Richtung Parteivorsitz.
APA/TOBIAS STEINMAUER

Mindestlohn vs. 32-Stunden-Woche

Wer stehen die beiden Kontrahenten eigentlich nicht mehr
Fragehagen bietet Unentschlossenen eine Entscheidungshilfe, wo sie ihr



NEXT.JS

Vercel

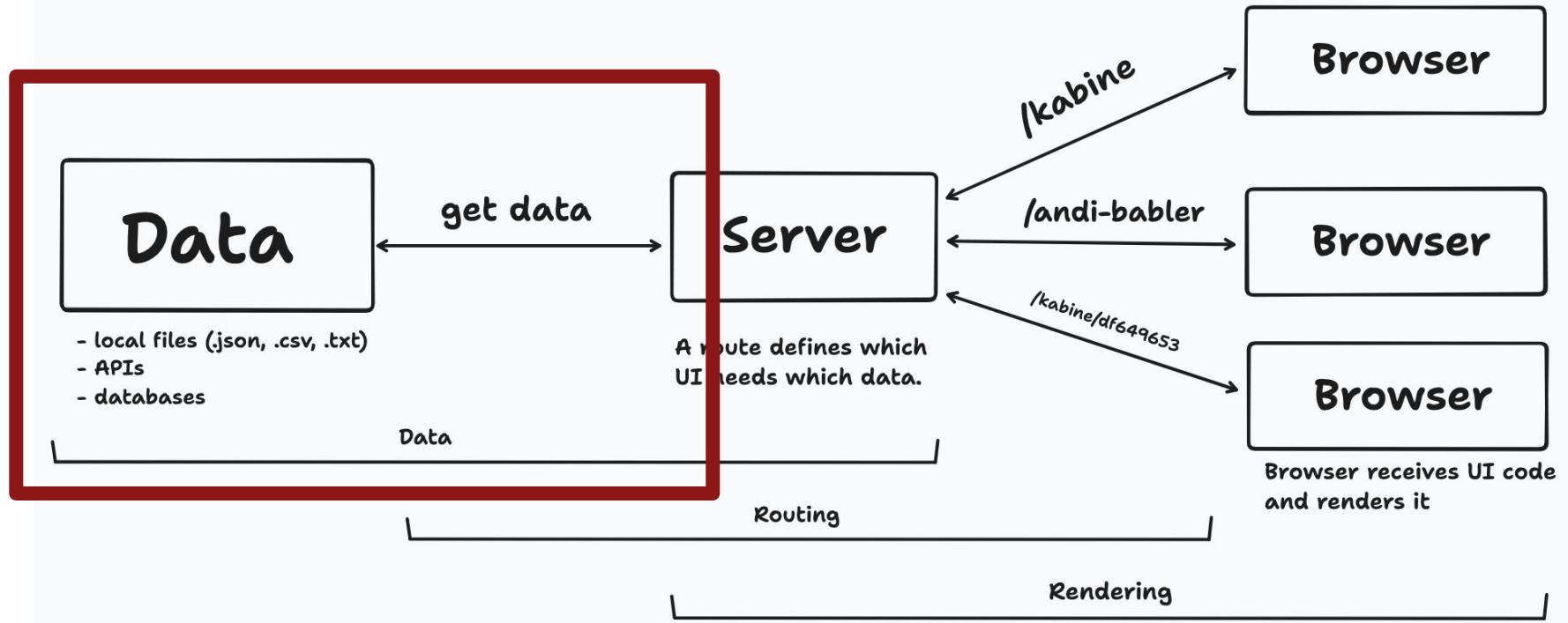
tailwindcss

Prisma

MySQL™

PlanetScale

anatomy of a web application



relational databases 101

MySQL is an open-source relational database.

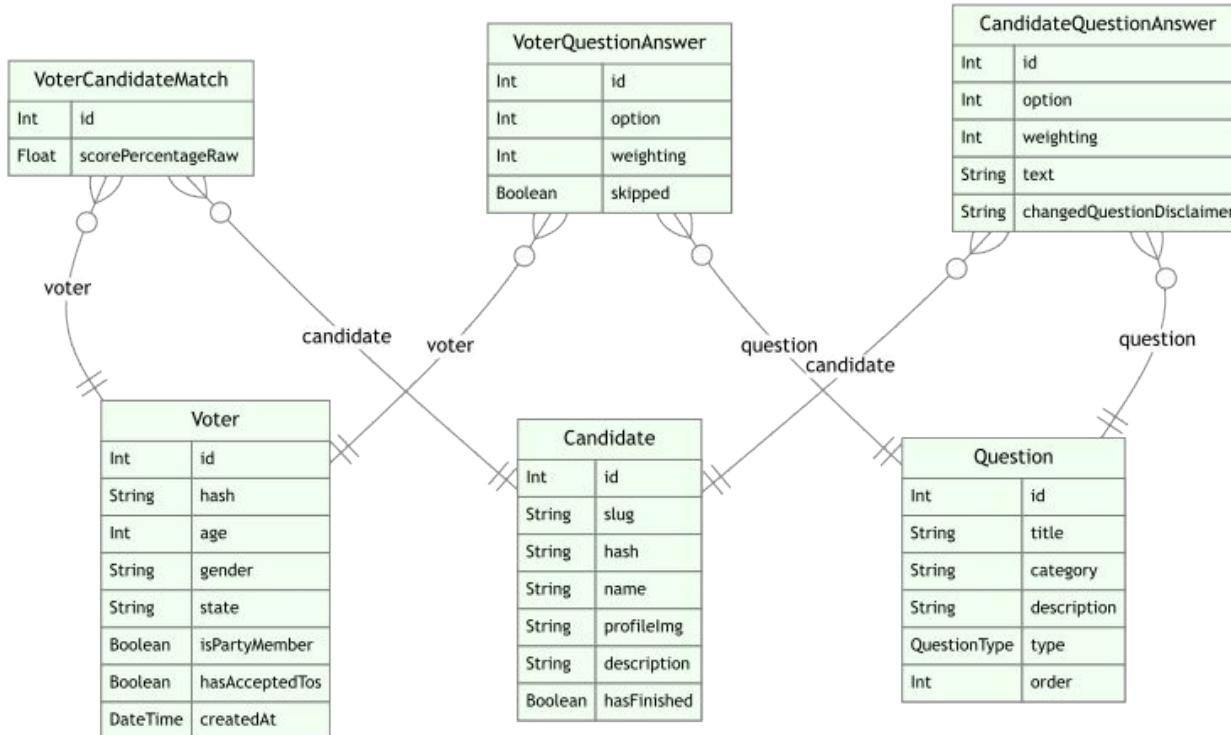
a **database** contains **tables** which have **columns** and **rows**.

tables are connected via **foreign keys** which can be queried together via SQL (Structured Query Language).

“Voter” table

id	hash	age	gender	hasAcceptedTos	state	isPartyMember	createdAt	^
158	692a5afdf	32	w	1	Wien	1	2023-04-21 10:01:32.836	⌄
157	fb6352a0	56	w	1	Wien	1	2023-04-21 10:01:32.836	⌄
156	1ee8f11d	25	w	1	Burgenland	1	2023-04-21 10:01:32.836	⌄
155	36b15678	28	w	1	Wien	1	2023-04-21 10:01:32.836	⌄
154	92c2642f	36	m	1	Niederösterreich	1	2023-04-21 10:01:32.836	⌄
153	e9482857	23	w	1	Niederösterreich	1	2023-04-21 10:01:32.836	⌄
152	23ffa5fd	33	m	1	Wien	1	2023-04-21 10:01:32.836	⌄
151	604d10da	20	w	1	Niederösterreich	1	2023-04-21 10:01:32.836	⌄
150	fa9ee18b	20	w	1	Niederösterreich	1	2023-04-21 10:01:32.836	⌄
149	e4393ce7	28	m	1	Wien	1	2023-04-21 10:01:32.836	⌄
148	d879ca9f	57	m	1	Niederösterreich	1	2023-04-21 10:01:32.836	⌄
147	aaf77a73	27	m	1	Wien	1	2023-04-21 10:01:32.836	⌄
146	29f418d7	21	m	1	Burgenland	1	2023-04-21 10:01:32.836	⌄
145	578c7e14	32	m	1	Wien	1	2023-04-21 10:01:32.836	⌄

database model



querying data via SQL

SQL query:

```
SELECT
    c.name,
    q.title,
    cqa.`option`,
    cqa.weighting
FROM
    Candidate c
    JOIN CandidateQuestionAnswer cqa ON c.id = cqa.candidateId
    JOIN Question q ON cqa.questionId = q.id
WHERE
    c.name = 'Andreas Babler'
```

querying data via SQL

Data returned:

	name	title	option	weighting
1	Andreas Babler	Sollen EU-Bürger*innen ein Wahlrecht auf Bundesebene bekommen?	-3	1
2	Andreas Babler	Soll der Besitz der Doppelstaatsbürgerschaft in Österreich erlaubt werden?	3	1
3	Andreas Babler	Bist du für eine verpflichtende Volksabstimmung, wenn ein Volksbegehren von 10% all...	3	0
4	Andreas Babler	Bist du für eine Sanktionierung jener Bundesländer, die weniger Geflüchtete aufnehmen...	3	2
5	Andreas Babler	Findest du es legitim, dass sich Jugendliche für ihre Überzeugungen auf die Straße kle...	3	1
6	Andreas Babler	Tempo 100 km/h auf der Autobahn?	3	1
7	Andreas Babler	Sollten Kurzstreckenflüge eingeschränkt werden? (unter 1000 km, Bsp.: Wien - Hambu...	3	1
8	Andreas Babler	Die Klimakrise ist das größte Problem dieses Jahrhunderts.	2	3
9	Andreas Babler	Um das Klima zu schützen, müssen unpopuläre Entscheidungen getroffen werden.	-2	1
10	Andreas Babler	Um den Herausforderungen unserer Zeit (Klimakrise, Armut, Vermögenskonzentration,...	2	3
11	Andreas Babler	Solltest du Bundeskanzler*in werden, würde deine Regierung zu 50% aus Frauen beste...	3	3

what is Prisma

Prisma is a library for interacting with databases from JS/TS.

It can:

- define a database schema
- handle database changes via migrations
- query, update and insert data while maintaining type safety

```
return await prisma.candidate.findUnique({  
  where: {  
    slug: "andreas-babler",  
  },  
  include: {
```

querying data via Prisma

Prisma query:

```
const candidate = await prisma.candidate.findUnique({  
  where: {  
    slug,  
  },  
  include: {  
    answers: {  
      include: {  
        question: true,  
      },  
    },  
  },  
});
```

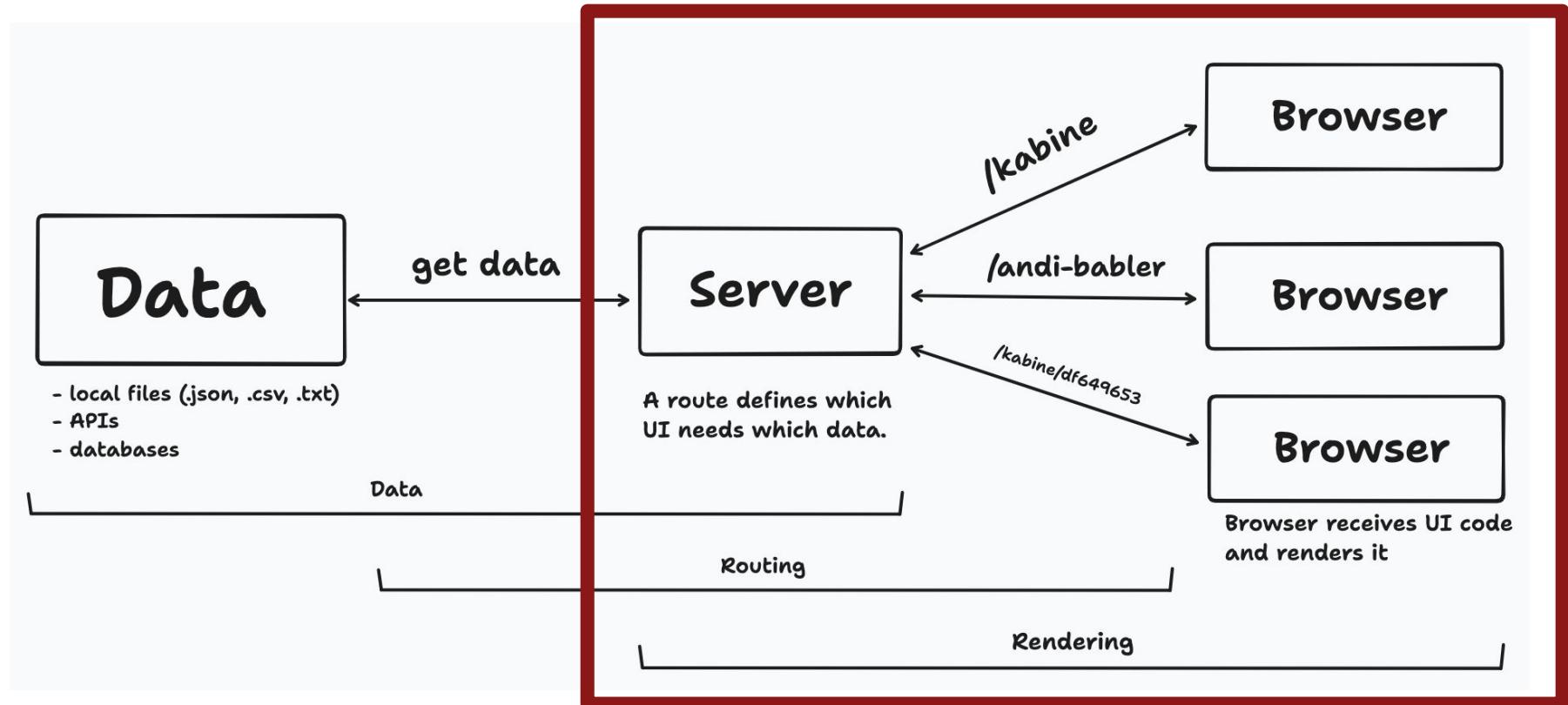
generated SQL:

querying data via Prisma

Data returned:

```
{  
  "id": 9,  
  "name": "Andreas Babler",  
  "answers": [  
    {  
      "id": 15731,  
      "questionId": 4,  
      "option": -3,  
      "weighting": 1,  
      "text": "Zum Wahlrecht hat der VfGH 2004 entschieden,  
      "changedQuestionDisclaimer": null,  
      "question": {  
        "id": 4,  
        "title": "Sollen EU-B\u00fcrger*innen ein Wahlrecht au-",  
        "category": "Demokratie & Mitbestimmung",  
        "type": "YesNo",  
        "order": 19  
      }  
    },  
    {  
    }
```

anatomy of a web application



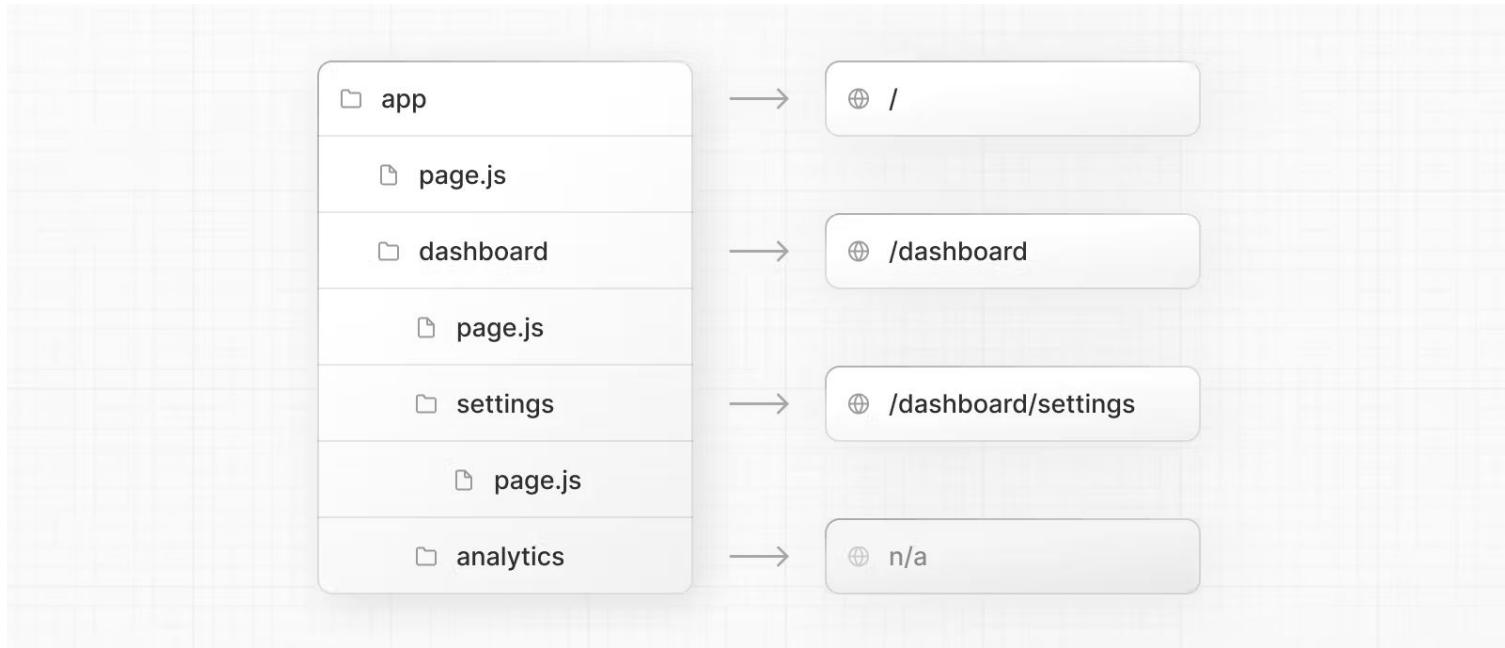
routing and rendering

a route defines at which **URL** what **data** gets fetched and what **view code** should render with the **data**.

rendering means executing the **view code** with the **data** to create an **user interface**.

rendering and routing can happen
on the server **and/or** the browser
depending on the strategy used

routing & rendering with Next.js



<https://nextjs.org/docs/app/building-your-application/routing/defining-routes>

routing & rendering with Next.js

a route is a function exported inside specifically named file.

it can access the HTTP request and returns a React component which Next.js renders.

route: /[candidateSlug]

file: /app/[candidateSlug]/page.tsx

valid routes:

/andreas-babler

/pamela-rendi-wagner

/hans-peter-doskozil

```
46  export default async function CandidateProfile({  
47    params,  
48  }: {  
49    params: { candidateSlug: string };  
50  }) {  
51    const candidate = await prisma.candidate.findUnique({  
52      where: {  
53        slug: params.candidateSlug,  
54      },  
55      include: {  
56        answers: {  
57          include: {  
58            question: true,  
59          },  
60        },  
61      },  
62    );  
63  
64    if (!candidate) {  
65      notFound();  
66    }  
67    You, 2 months ago • basic flow for candidates and  
68  
69    return (  
70      <section>  
71        {candidate.hasFinished ? (
```

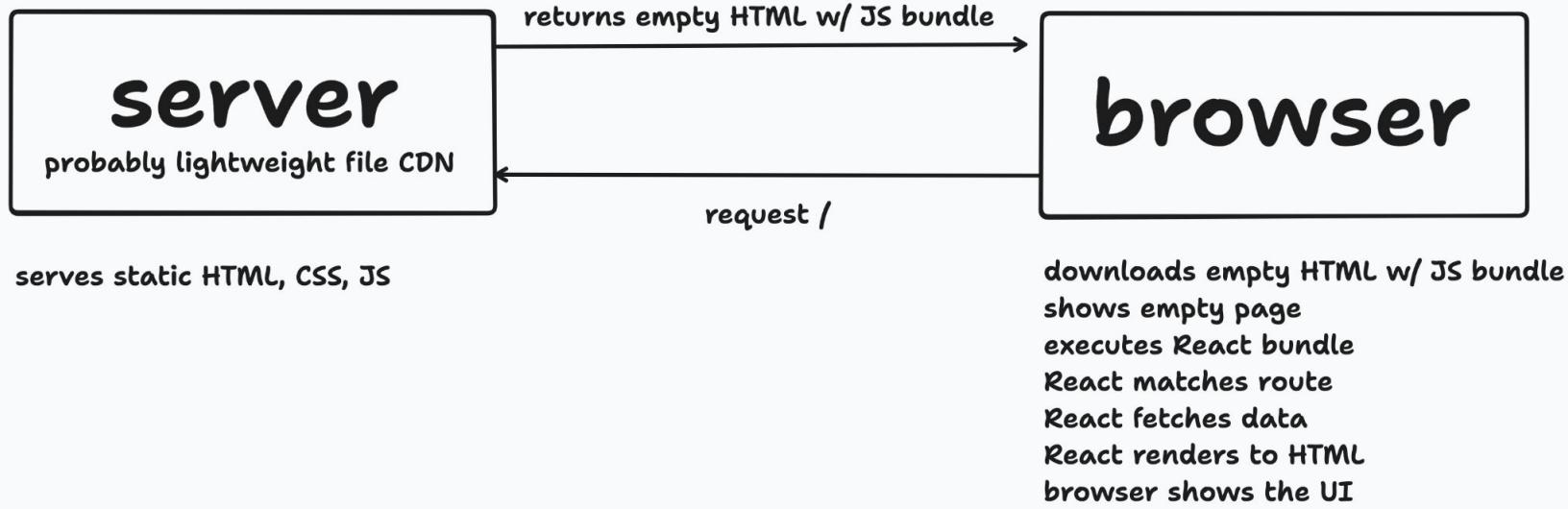
history of web rendering

- **static files**
 - request HTML like files on a remote server
- **dynamic servers**
 - backend code dynamically generates HTML based on route
- **client-side rendering**
 - server returns static “empty” HTML + JS bundle
 - Client executes JS which fetches data and renders HTML

history of web rendering

- **server-side rendering**
 - server returns fully rendered HTML + JS bundle
 - client shows rendered HTML
 - client executes JS bundle to take over HTML
- **server-side rendering w/ partial hydration**
 - server returns fully rendered HTML + JS bundle for specific components
 - client shows rendered HTML
 - client executes JS bundle to take over parts of the HTML

client-side rendering



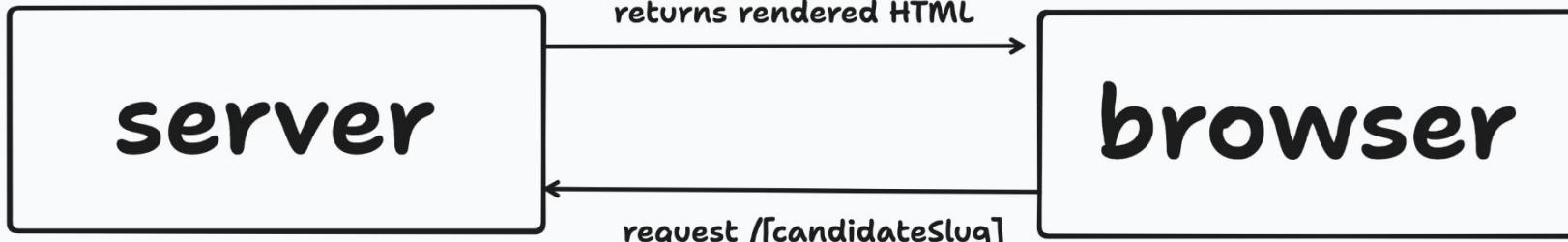
pros:

- offload all rendering to browser
- simple mental model

cons:

- can't access private data directly,
- data fetched happens after all JS is executed
- not optimized for search engines

server-side rendering



finds matching route

fetches data

renders React w/ data to HTML

sends ready HTML, CSS, JS, Images, etc

downloads HTML + CSS, JS, Images, etc

interprets everything to show UI

executes JS to "take over" the HTML again

=> hydration

pros:

- fast initial response with actual data
- optimized for search engines
- access private data directly

cons:

- more complex mental model
- needs actual servers for rendering

rendering mitentscheiden.at

almost all components are rendered **only** on the server
→ fetches data directly from DB and returns HTML

the **<Questionnaire />** component get passed data for SSR and becomes interactive on client
→ this allows for app-like behaviour like saving in-progress questionnaires in **localStorage**

ABC = always be caching

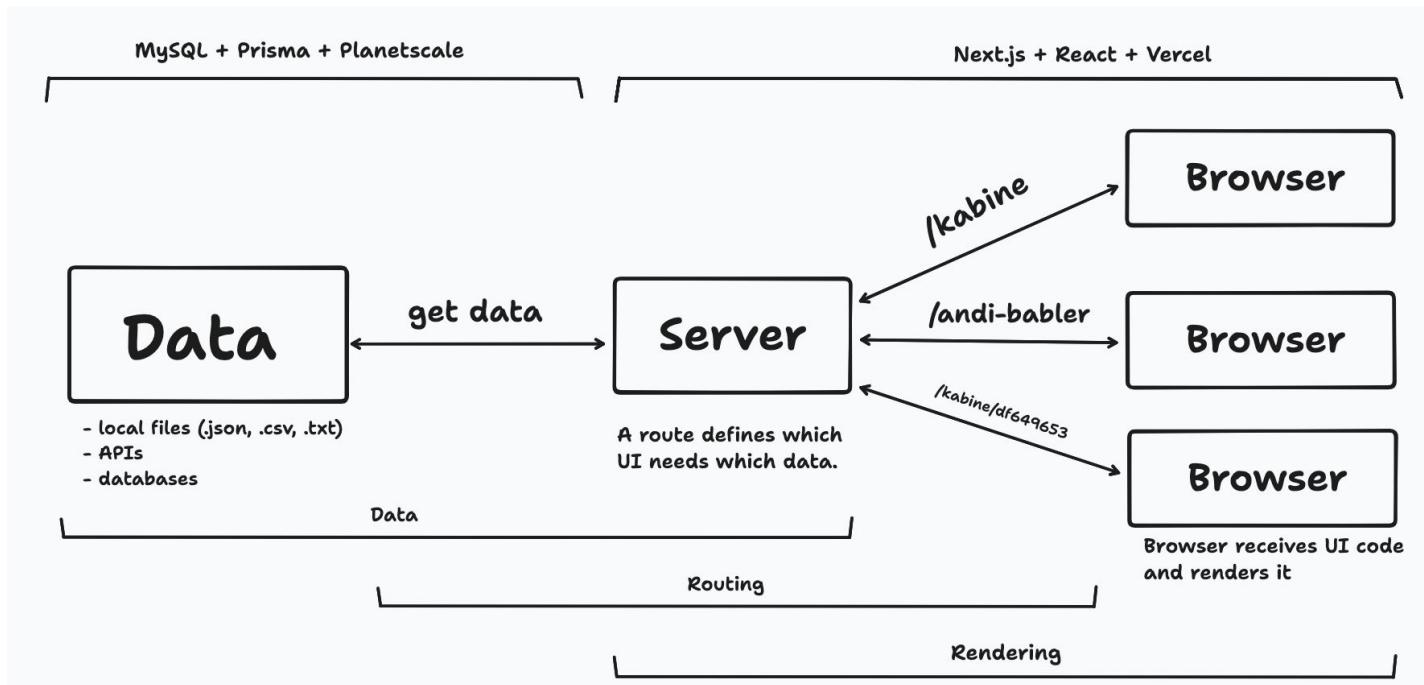
in Next.js every route and every fetch defines its own caching strategy.

the following caching strategies are supported:

- **static**
 - fetches data only when (re-)deploying app
- **dynamic**
 - every request gets fresh data
- **stale-while-revalidate**
 - set seconds after which data should be re-fetched in background

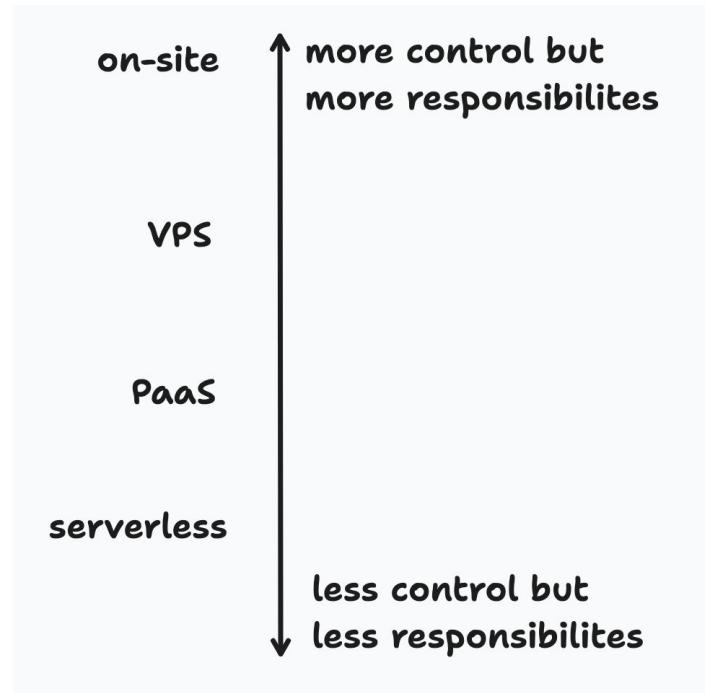
deployment

how do you make your web app available on the internet?



history of web deployment

- **on-site/physical servers**
 - manage everything (hardware, networking, OS, updates, etc)
- **virtual private servers (VPS)**
 - rent hardware in datacenter
- **platform as a service (PaaS)**
 - hardware is abstracted away → only think about code/data
- **serverless (functions)**
 - server is abstracted away → only think about code/data



how do serverless functions work?

serverless functions spin up temporary compute environments for every request which execute your code

after the request is handled the function shuts down again

pro: use exactly the amount of compute needed
→ **scale-to-zero** and **scale-to-millions**

con: no long-running tasks, higher costs after hitting certain limits,
cold-starts

types of serverless functions

- **lambda function**
 - boots full virtualized server
 - works with many languages like Javascript, Python, Ruby, Java
 - takes ~100-300 ms to boot
- **edge functions**
 - boots a lightweight runtime similar to the browser
 - works just with javascript
 - usually distributed world wide to get

deploying mitentscheiden.at

- **serverless database**

- Planetscale for serverless MySQL
- pay per row read/written and GB stored
- uses Vitess under the hood for hyper-scale
- supports database branching



- **serverless hosting**

- using Vercel for serverless functions and CDN
- AWS and Cloudflare under-the-hood
- deploy via Git
 - get separate testing environments for every branch



Total hosting costs:
0€

the future of mitentscheiden.at

we are starting a software team inside
Junge Generation Wien

mitentscheiden.at will become a
platform for letting party members
participate in the internal (democratic)
process



you can do this too!

tip #1:

build things – it's fun!

find problems in your daily life
you want to
fix with software

great tools you can use for free

- **full-stack frameworks**
 - Next.js, Remix for React
 - Nuxt for Vue
- **serverless hosting**
 - Vercel, Netlify, Cloudflare
- **databases**
 - Planetscale, Supabase, Neon, Railway, Sanity (headless CMS)
- **repository / project management**
 - Github, Linear, Trello, Slack

web development resources

- **twitter:** 300+ developers you can follow
- **youtube/twitch**
 - Fireship
 - Theo - t3.gg
- **local meetups**
 - vienna.js
 - React Vienna

**reads lots of documentation and
checkout example projects on Github!**

Questions?

twitter.com/chrcit

github.com/chrcit

slides:

<https://christiancito.com/16-06-23-anatomy-of-a-modern-web-application.pdf>