Vector Tiles

Workshop am Umweltbundesamt, Wien

→

Was sind Vector Tiles?

In vordefinierten Kacheln organisierte Pakete von Kartendaten, optimiert für das Web

- **Binäres Transfer-Format** - Mapbox Vector Tiles, basiert auf Protobuf
- **Vereinfachung auf Pixelauflösung** - Datentransfer und Rendern beschleunigt
- **Kein Feature Service** - sondern ein Darstellungsformat
- **Reduktion auf darzustellende Daten** - Vorhersehbare Datenmenge
- **Ganze Karte** - Ein Kachelset kann viele Datenschichten beinhalten
- **Separater Style beschreibt die Karte** - Mapbox Style Specification

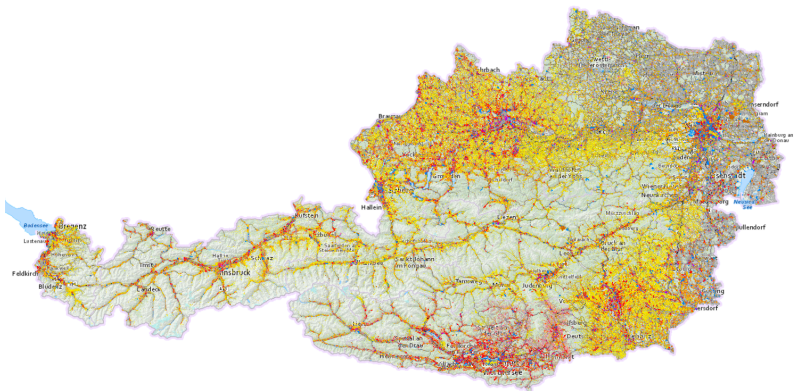
Im Vergleich mit WMS / WMTS und WFS / Features

	Tiled WMS / WMTS	WFS / Features	Vector Tiles
Web-Format	Bild	GeoJSON	binär
Cache	Output	nie	Preprocess + Input
Style	in-image	separat	separat
Geometrien	nicht verfügbar	original	vereinfacht, zerhackt
Attribute	separat	alle	für Style nötige
Primäre Anwendung	Web / Darstellung	GIS / Berechnungen	Web / Darstellung

The biggest improvement in map performance is from what you choose *not to draw*

(Tom MacWright)

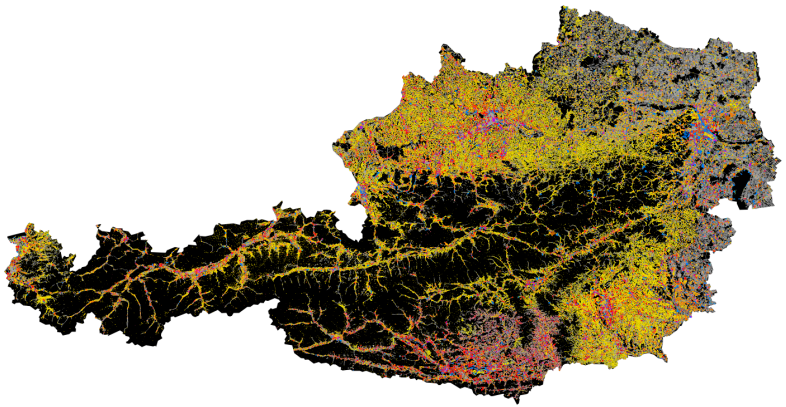
Flächeninanspruchnahme 2022


Bregenz
Innsbruck
Salzburg
Linz
Graz
Klagenfurt am Wörthersee
Eisenstadt
Sankt Pölten


Bregenz
Innsbruck
Salzburg
Linz
Graz
Klagenfurt am Wörthersee
Eisenstadt
Sankt Pölten

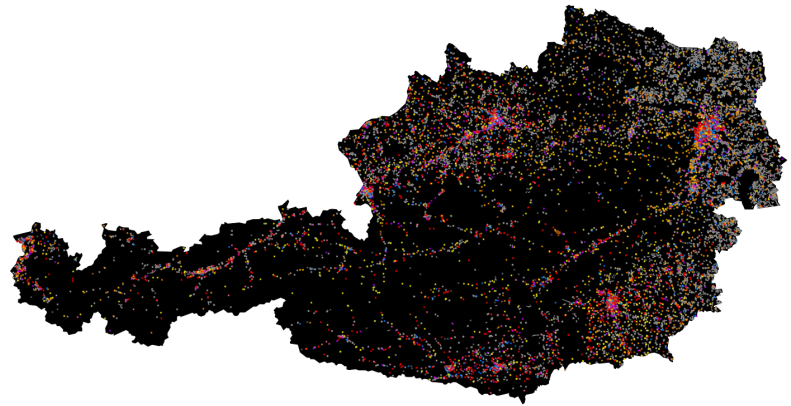
Flächeninanspruchnahme: 7 %
(bezogen auf die Gesamtfläche Österreichs)

Original-Datensatz (QGIS)



71 %

Vektorkacheln (OpenLayers)



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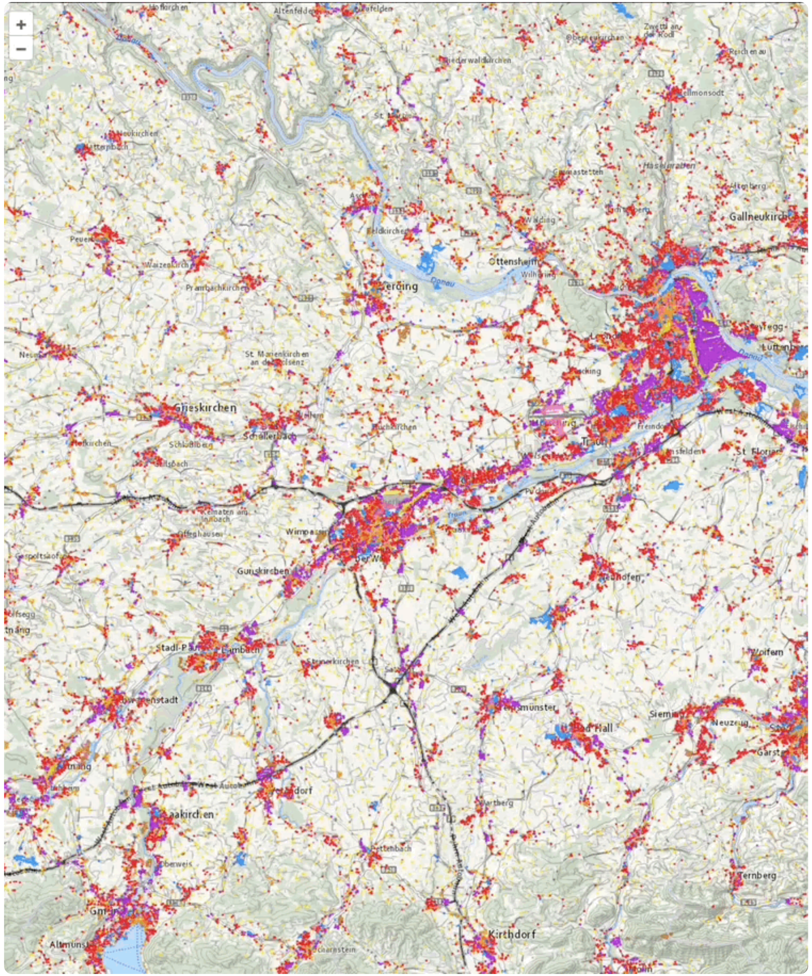

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Waizenkirchen
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St. Marienkirchen an der Polsenz
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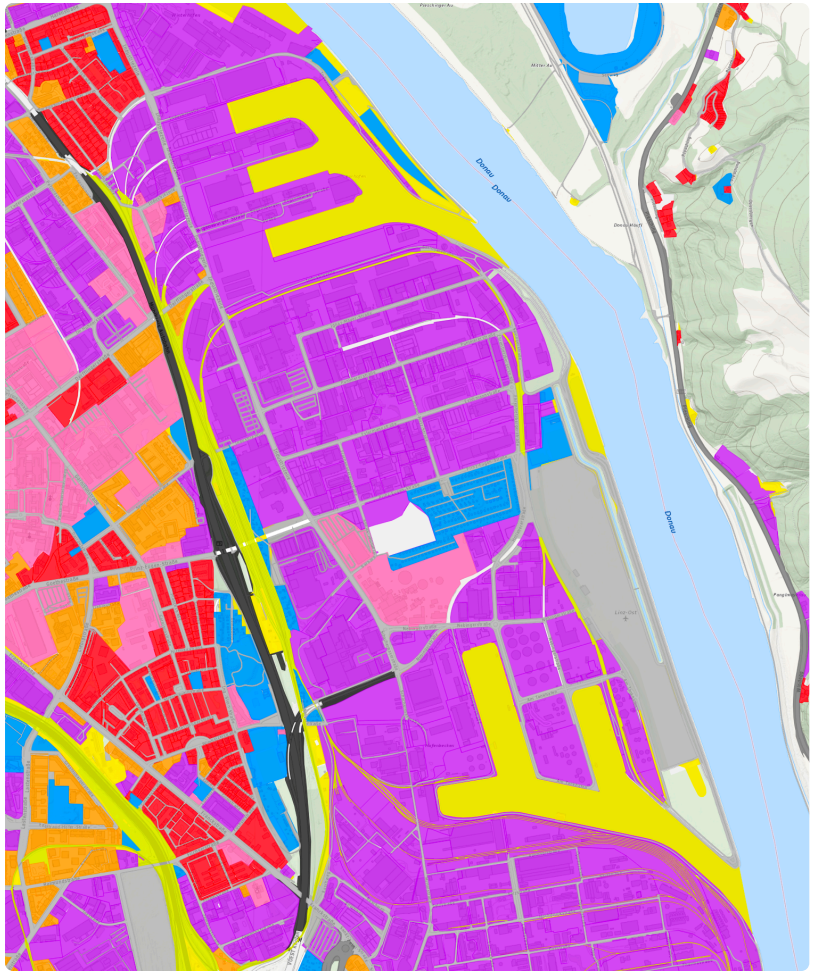
Schallerbach
Gunskirchen
Steinerkirchen
Wartberg
Pettenbach
Kirchdorf
Altmünster
Wolfern
Ternberg
Neuzeug
Garsten
St. Florian
Gallneukirchen
Feldkirchen
Walding
Danau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Donau
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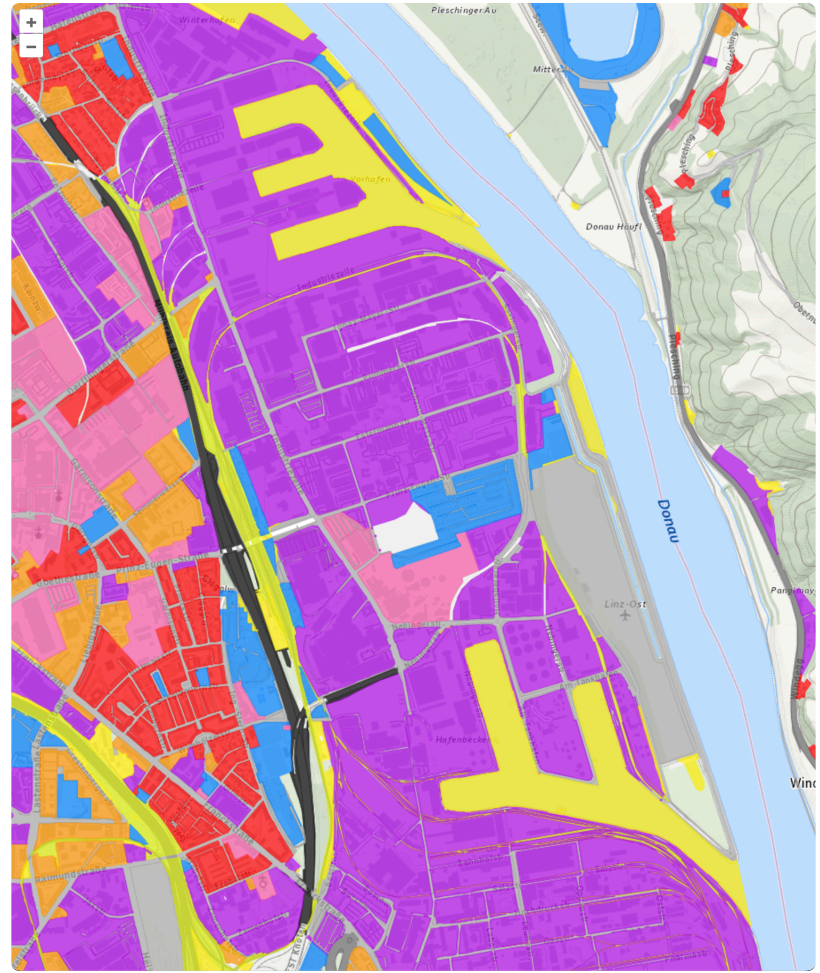
Linz-Ost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Mitterau
Donau Hlufl
Donau
Linz-Ost
Hafenbecken


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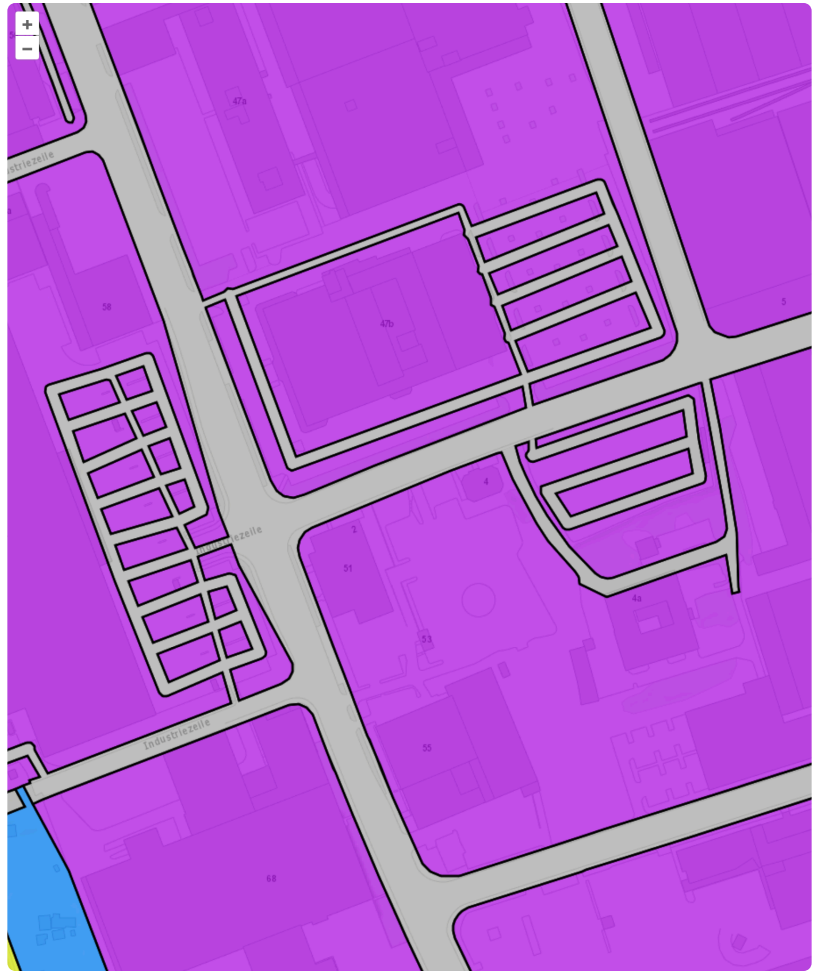
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Industriezelle

Warum Vector Tiles?

Kartographisch ansprechende Karten für das Web mit guter Performance

- Einfaches Publizieren von **Karten** (Tiles + Style)
- Serverless
- Geringere Datenmenge als Image Tiles
- Hohe Bildschirmauflösungen und Head-up Ansichten
- ~~Publizieren von Geodaten~~
- ~~Editieren von Geometrien~~
- ~~Vektorbasierte GIS-Analytik~~

Vector Tiles sind nicht Geodaten, sondern deren darstellungsoptimierte Repräsentation

(Andreas Hocevar)

Culling

Wegwerfen von Daten

- Auswählen aus einer großen Menge
- Beziehen aus einer Vielzahl von Quellen
- Vereinfachen

Beispiel OpenLayers

	GeoJSON	Vector Tiles
Einmalig beim Laden der Karte	▪ Laden großer Dateien ▪ Räumliche Indizierung im Speicher	
Beim Interagieren mit der Karte	▪ Daten für den aktuell sichtbaren Extent aus dem Speicher holen ▪ Umrechnen von geographisch/projiziert auf Bildschirmkoordinaten ▪ Vereinfachen der Geometrien (Quantizing, Douglas-Peucker) ▪ Filtern ▪ Rendern	▪ (Laden der benötigten Vector Tiles) ▪ (Filtern) ▪ Rendern

Code

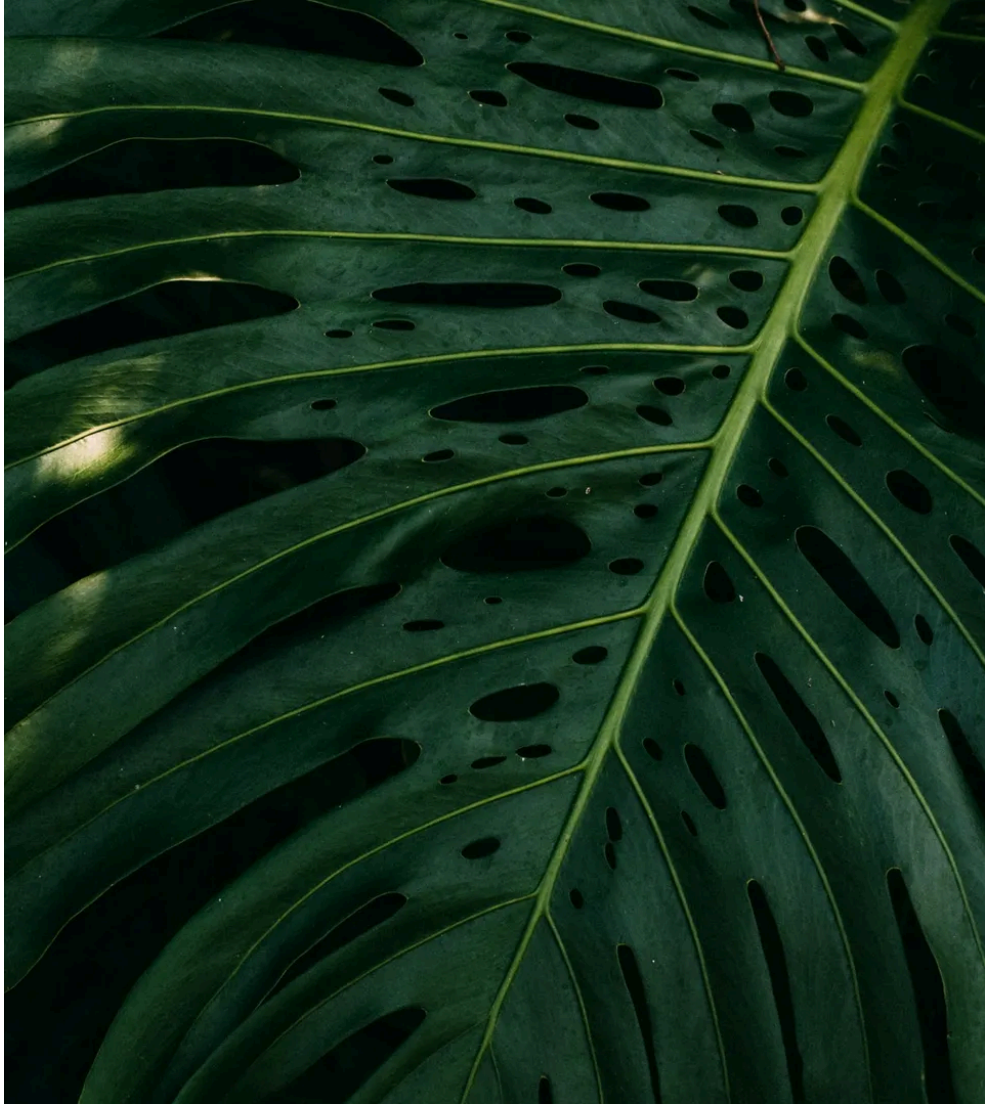
Use code snippets and get the highlighting directly, and even types hover!

```ts
// TwoSlash enables TypeScript hover information
// and errors in markdown code blocks
// More at https://shiki.style/packages/twoslash

import { computed, ref } from 'vue'

const count = ref(0)
const doubled = computed(() => count.value * 2)

doubled.value = 2
```

```
Cannot assign to 'value' because it is a read-only
```

```ts
// Inside ./snippets/external.ts
export function emptyArray<T>(length: number) {
  return Array.from<T>({ length })
}
```

Learn more



Shiki Magic Move

Powered by shiki-magic-move, Slidev supports animations across multiple code snippets.

Add multiple code blocks and wrap them with ````md magic-move` (four backticks) to enable the magic move. For example:

```
// step 1
const author = reactive({
  name: 'John Doe',
  books: [
    'Vue 2 - Advanced Guide',
    'Vue 3 - Basic Guide',
    'Vue 4 - The Mystery'
  ]
})
```

Components

You can use Vue components directly inside your slides.

We have provided a few built-in components like `<Tweet />` and `<Youtube />` that you can use directly. And adding your custom components is also super easy.

```
<Counter :count="10" />
```

Check out the guides for more.

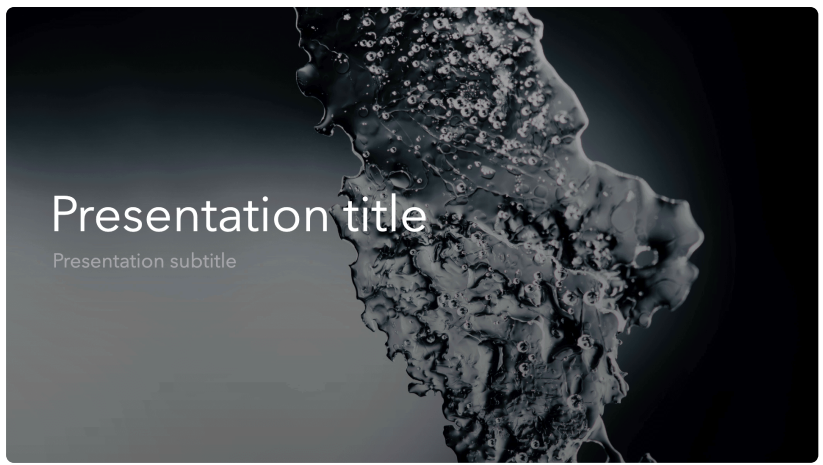
```
<Tweet id="1390115482657726468" />
```

Themes

Slidev comes with powerful theming support. Themes can provide styles, layouts, components, or even configurations for tools. Switching between themes by just **one edit** in your frontmatter:

```yaml
---
theme: default
---
```

```yaml
---
theme: seriph
---
```



Read more about How to use a theme and check out the Awesome Themes Gallery.

Clicks Animations

You can add `v-click` to elements to add a click animation.

This shows up when you click the slide:

```
<div v-click>This shows up when you click the slide.</div>
```

The `v-mark` directive also allows you to add inline marks, powered by Rough Notation:

```
<span v-mark.underline.orange>inline markers</span>
```

Learn more

Motions

Motion animations are powered by @vueuse/motion, triggered by `v-motion` directive.

```
<div
  v-motion
  :initial="{ x: -80 }"
  :enter="{ x: 0 }"
  :click-3="{ x: 80 }"
  :leave="{ x: 1000 }"
>
  Slidev
</div>
```

Slidev

Learn more

LaTeX

LaTeX is supported out-of-box. Powered by KaTeX.

Inline $\sqrt{3x-1}+(1+x)^2$

Block

$$\nabla \cdot \vec{E} = \frac{\rho}{\varepsilon_0}$$

$$\nabla \cdot \vec{B} = 0$$

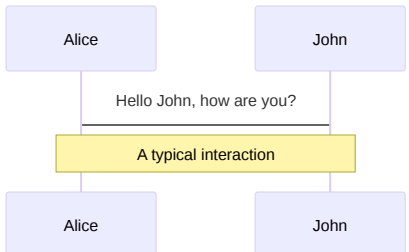
$$\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$$

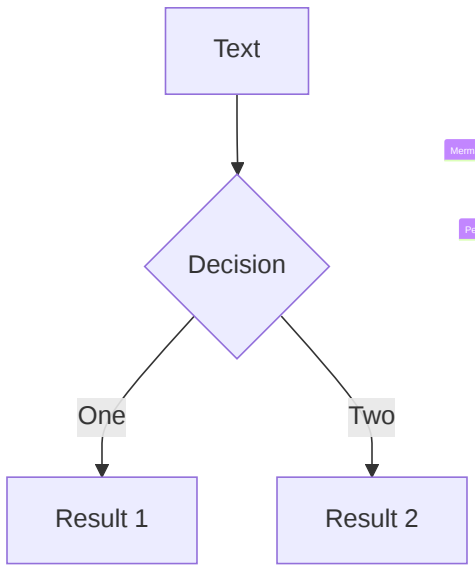
$$\nabla \times \vec{B} = \mu_0\vec{J} + \mu_0\varepsilon_0\frac{\partial \vec{E}}{\partial t}$$

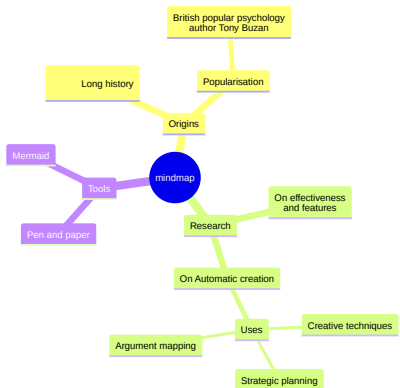
Learn more

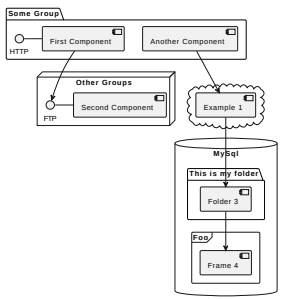
Diagrams

You can create diagrams / graphs from textual descriptions, directly in your Markdown.









Learn more: Mermaid Diagrams and PlantUML Diagrams

Draggable Elements

Double-click on the draggable elements to edit their positions.

DIRECTIVE USAGE

```
<img v-drag="'square'" src="https://sli.dev/logo.png">
```

COMPONENT USAGE

```
<v-drag text-3xl>
  <carbon:arrow-up />
  Use the `v-drag` component to have a draggable container!
</v-drag>
```

DRAGGABLE ARROW

```
<v-drag-arrow two-way />
```

Imported Slides

You can split your slides.md into multiple files and organize them as you want using the `src` attribute.

`slides.md`

```
# Page 1

Page 2 from main entry.

---

## src: ./subpage.md
```

`subpage.md`

```
# Page 2

Page 2 from another file.
```

Learn more

Monaco Editor

Slidev provides built-in Monaco Editor support.

Add `{monaco}` to the code block to turn it into an editor:

```ts
import { ref } from 'vue'
import { emptyArray } from './external'

const arr = ref(emptyArray(10))
```

Use `{monaco-run}` to create an editor that can execute the code directly in the slide:

```ts
import { version } from 'vue'
import { emptyArray, sayHello } from './external'

sayHello()
console.log(`vue ${version}`)
console.log(emptyArray<number>(10).reduce(fib => [...fib, fib.at(-1)! + fib.at(-2)!], [1, 1]))
```

```
vue 3.5.6
[1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144]
```

Learn More

Documentation · GitHub · Showcases

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