

# Front-End Frameworks

## Aula 2

***Dsc. Francisco Nauber Bernardo Gois***



# Francisco Nauber Bernardo Gois

## Dsc. Informática Aplicada



Experiência Profissional

Auditor de Controle Interno e Professor da Especialização em Ciência de Dados

Cientista de Dados (2021-2022)

Cientista de Dados (Manutenção Preditiva com Modelos de Aprendizado de Máquina e Sistemas Autônomos) - Lisboa, Portugal (2020-2021)

Líder da Equipe de Inteligência Artificial da Secretaria de Saúde no Combate a COVID-19 (2019-2020)

Professor Adjunto - Campus Russas (2017-2019)

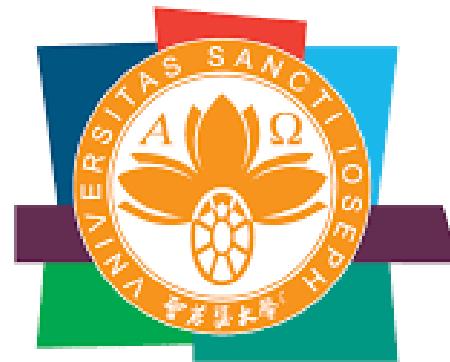
Analista de Sistemas e Cientista de Dados (2004-2017)



# Francisco Nauber Bernardo Gois

## Dsc. Informática Aplicada

Formação Acadêmica



聖若瑟大學  
UNIVERSITY OF  
SAINT JOSEPH

**Pós Doutorado- Laboratório de Neurociência  
Aplicada (2022-2025)**



**Doutorado em Informática Aplicada (2012-2017)  
Search-based Stress Test: an approach applying evolutionary  
algorithms and trajectory methods**



**Mestrado em Informática Aplicada (2012-2017)**



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# Objetivo

**Ao fim dessa aula o aluno será capaz de identificar os principais paradigmas e técnicas de desenvolvimento de aplicações para a internet**



# Avaliação

**Avaliação Teórica e Prática aplicando conceitos apresentados na modelagem de desenvolvimento de um sistema utilizando uma linguagem de escolha do Aluno. A construção do sistema será incremental durante as aulas.**



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ser  
educacional





<https://www.youtube.com/watch?v=lWEZFEBksdM>



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## Material UI

## Alo Mundo

```
import * as React from 'react';
import Button from '@mui/material/Button';

function App() {
  return <Button variant="contained">Hello World</Button>;
}
```

<https://codesandbox.io/s/material-ui-u9sy1h>

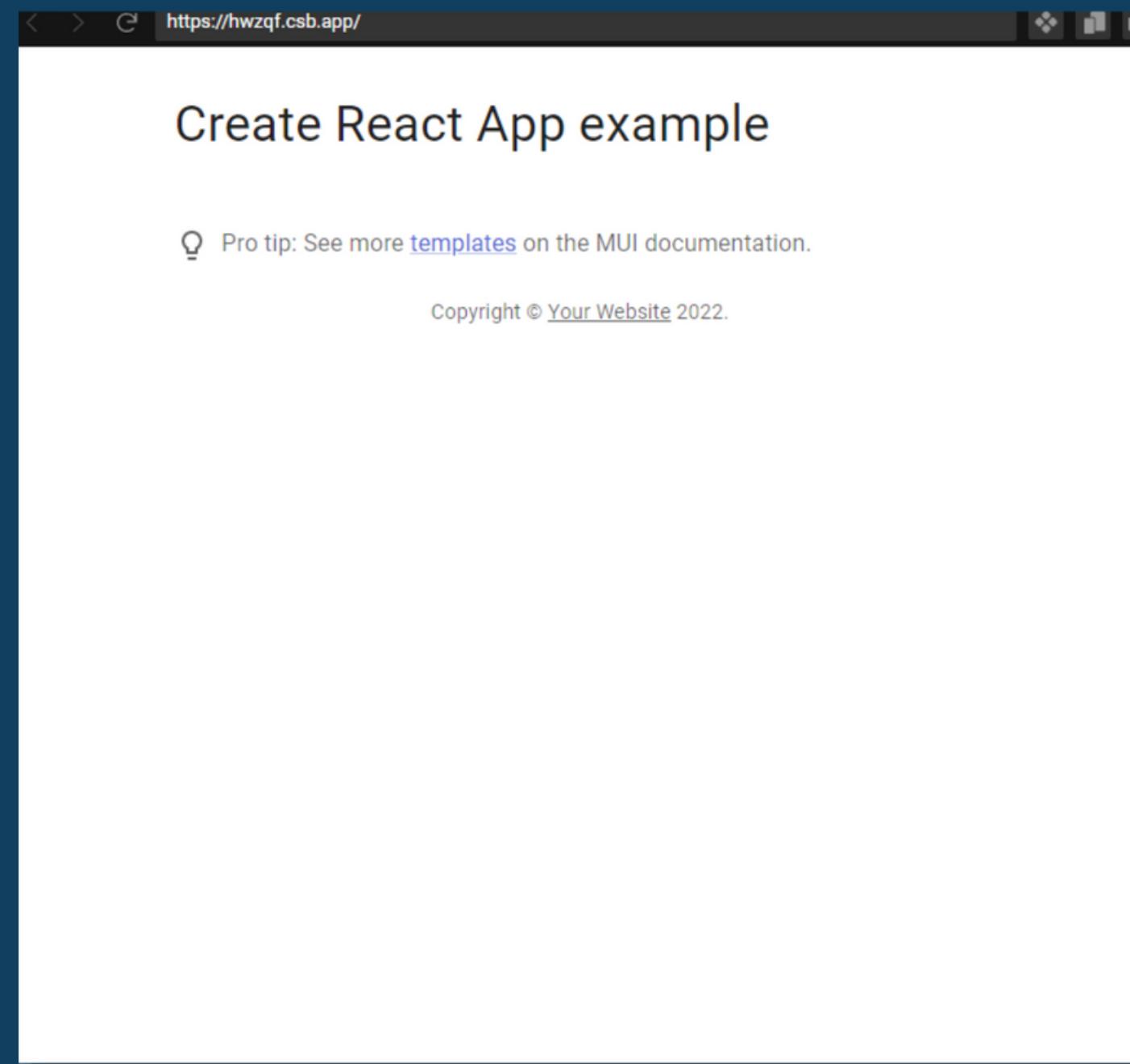


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## Material UI

Alo Mundo



<https://codesandbox.io/s/github/mui/material-ui/tree/master/examples/create-react-app?file=/src/App.js:0-829>

<https://stackblitz.com/github/mui/material-ui/tree/master/examples/create-react-app?file=README.md>

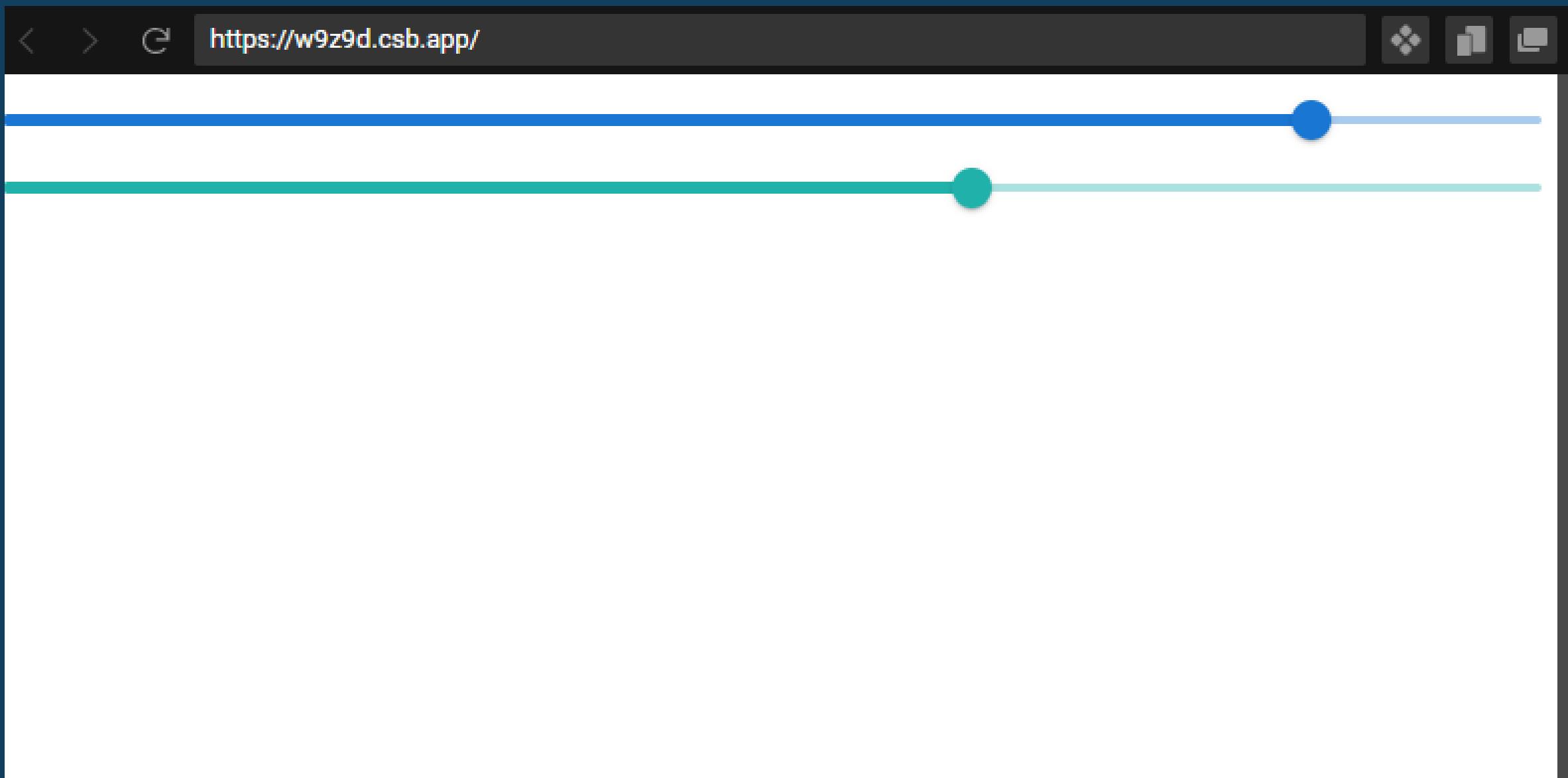


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## Material UI

## Styled Components



<https://codesandbox.io/s/styled-components-interoperability-w9z9d?file=/src/App.js>

# Focused on **web standards** and **modern web app UX**, you're simply going to **build better websites**

Remix is a full stack web framework that lets you focus on the user interface and work back through web standards to deliver a fast, slick, and resilient user experience. People are gonna love using your stuff.

[Read the Docs](#)[Get Started](#)

```
export async function loader({ request }) {
  return getProjects();
}

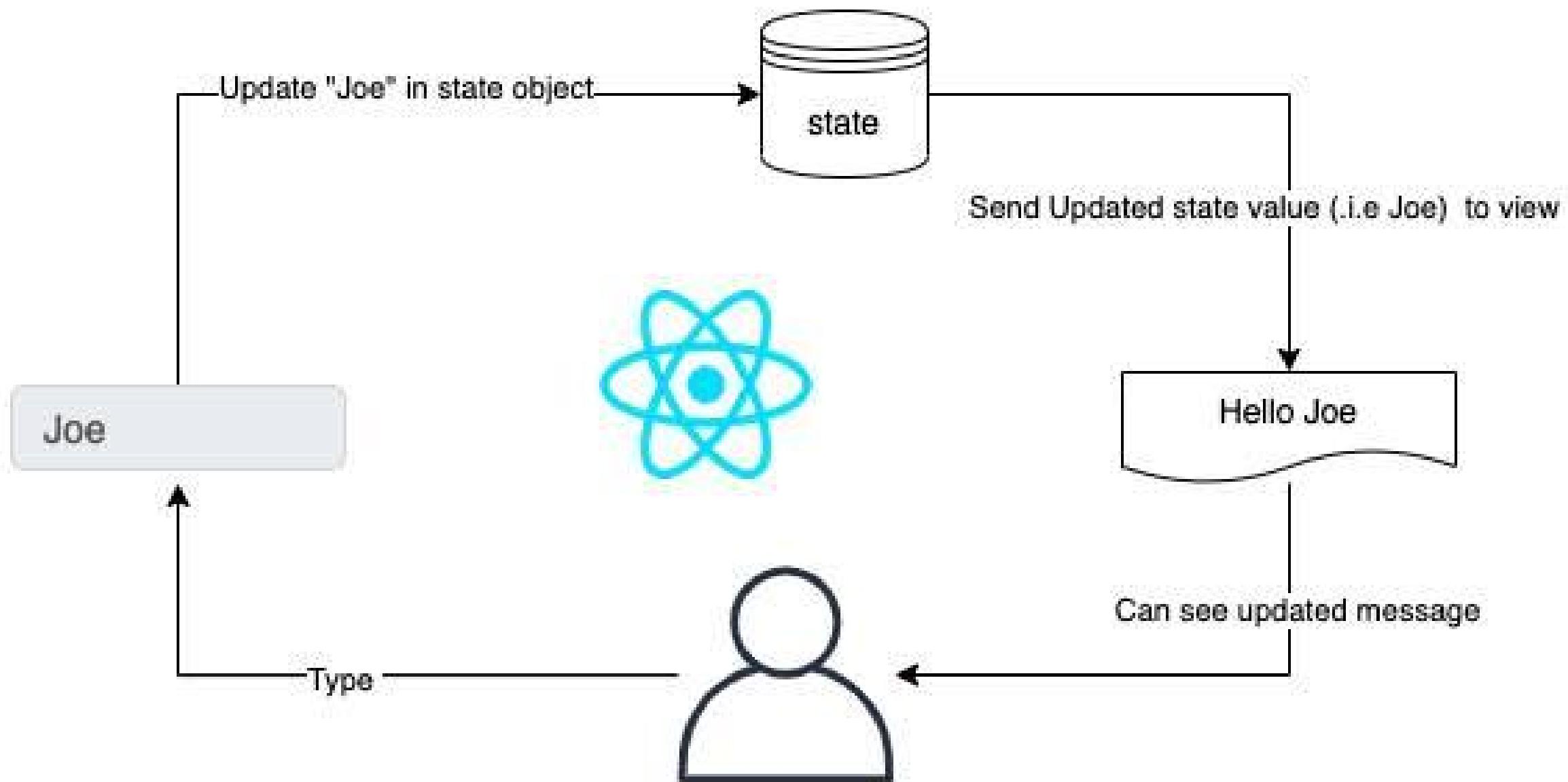
export async function action({ request }) {
  const form = await request.formData();
  return createProject({ title: form.get("title") });
}

export default function Projects() {
  const projects = useLoaderData();
  const { state } = useTransition();
  const busy = state === "submitting";

  return (
    <div>
      {projects.map((project) => (
        <Link to={project.slug}>{project.title}</Link>
      ))}
      <Form method="post">
        <input name="title" />
        <button type="submit" disabled={busy}>
          {busy ? "Creating..." : "Create New Project"}
        </button>
      </Form>
    </div>
  );
}
```



## Update the State

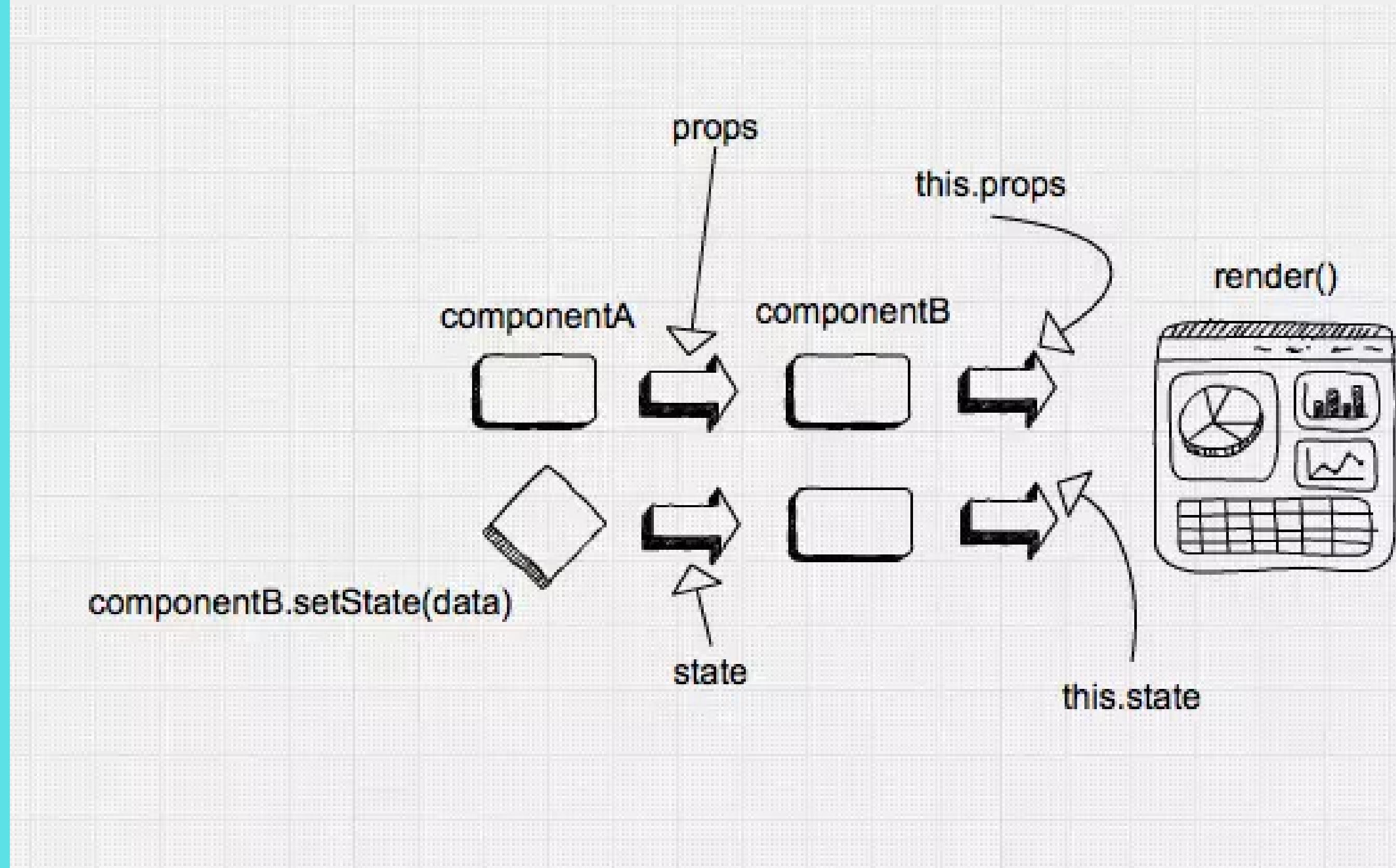




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## Update the State





## Update the State

```
const ExpenseForm = () => {  
  const [enteredTitle, setEnteredTitle] = useState('');  
  const [enteredAmount, setEnteredAmount] = useState('');  
  const [enteredDate, setEnteredDate] = useState('');  
  // const [userInput, setUserInput] = useState({  
  //   enteredTitle: '',  
  //   enteredAmount: '',  
  //   enteredDate: '',  
  // });  
  
  const titleChangeHandler = (event) => {  
    setEnteredTitle(event.target.value);  
    // setUserInput({  
    //   ...userInput,  
    //   enteredTitle: event.target.value,  
    // });  
    // setUserInput((prevState) => {  
    //   return { ...prevState, enteredTitle: event.target.value };  
    // });  
  };  
};
```

<https://github.com/naubergois/datasets/tree/master/ForReact/04-updating-state-that-depends-on-previous-state>



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## Find the Match

<https://codepen.io/kunukn/pen/OMzvrM>





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# Form Submission

Title	Amount
12	121

Date: 03/08/2022

<b>August 2020 14</b>	<b>Updated!</b>	<b>\$94.12</b>	<input type="button" value="Change Title"/>
<b>March 2021 12</b>	<b>Updated!</b>	<b>\$799.49</b>	<input type="button" value="Change Title"/>
<b>March 2021 28</b>	<b>Updated!</b>	<b>\$294.67</b>	<input type="button" value="Change Title"/>
<b>June 2021 12</b>	<b>New Desk (Wooden)</b>	<b>\$450</b>	<input type="button" value="Change Title"/>

<https://github.com/naubergois/datasets/tree/master/ForReact/05-handling-form-submission>



## AJAX

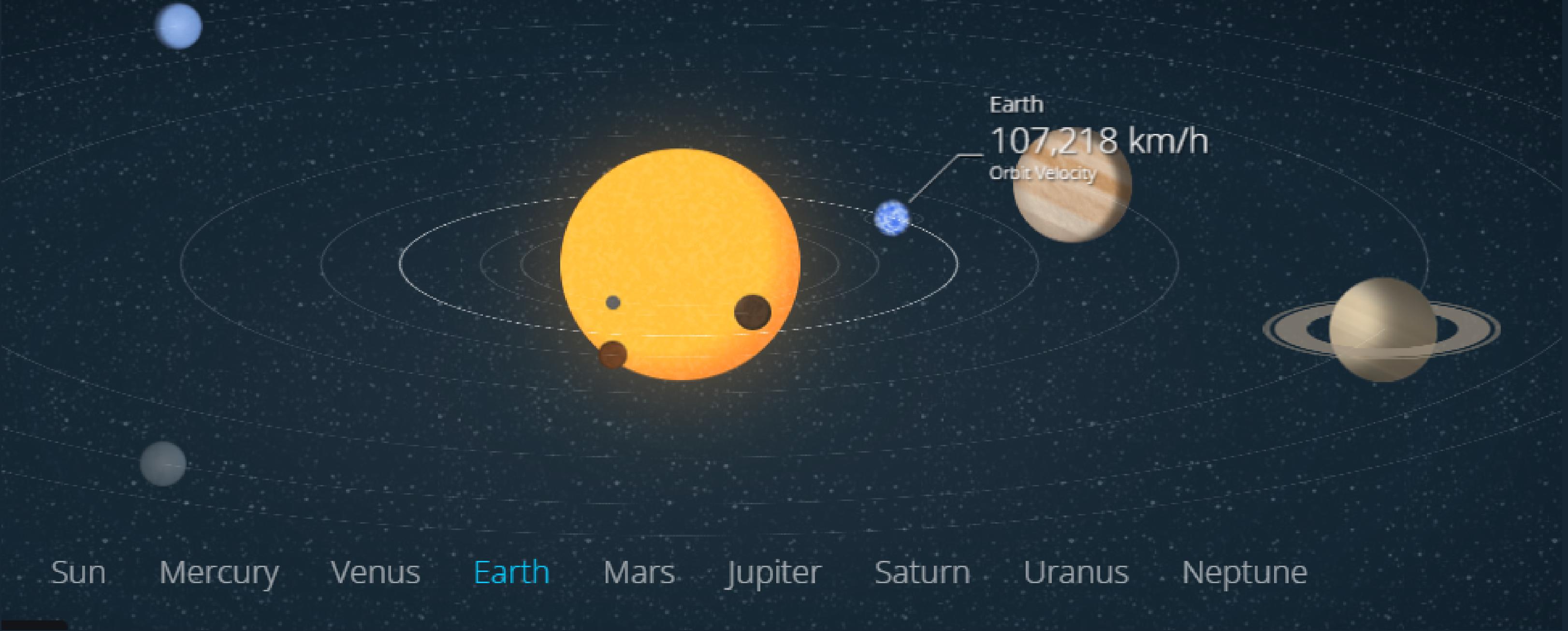
# AJAX



**Ajax (acrônimo em língua inglesa de Asynchronous Javascript and XML[1], em português "Javascript Assíncrono e XML")** é o uso metodológico de tecnologias como Javascript e XML, providas por navegadores, para tornar páginas Web mais interativas com o usuário, utilizando-se de solicitações assíncronas de informações. Foi inicialmente desenvolvida pelo estudioso Jesse James Garret e mais tarde por diversas associações. Apesar do nome, a utilização de XML não é obrigatória (JSON é frequentemente utilizado) e as solicitações também não necessitam ser assíncronas[2].

# 3D Solar System

by @JulianGarnier

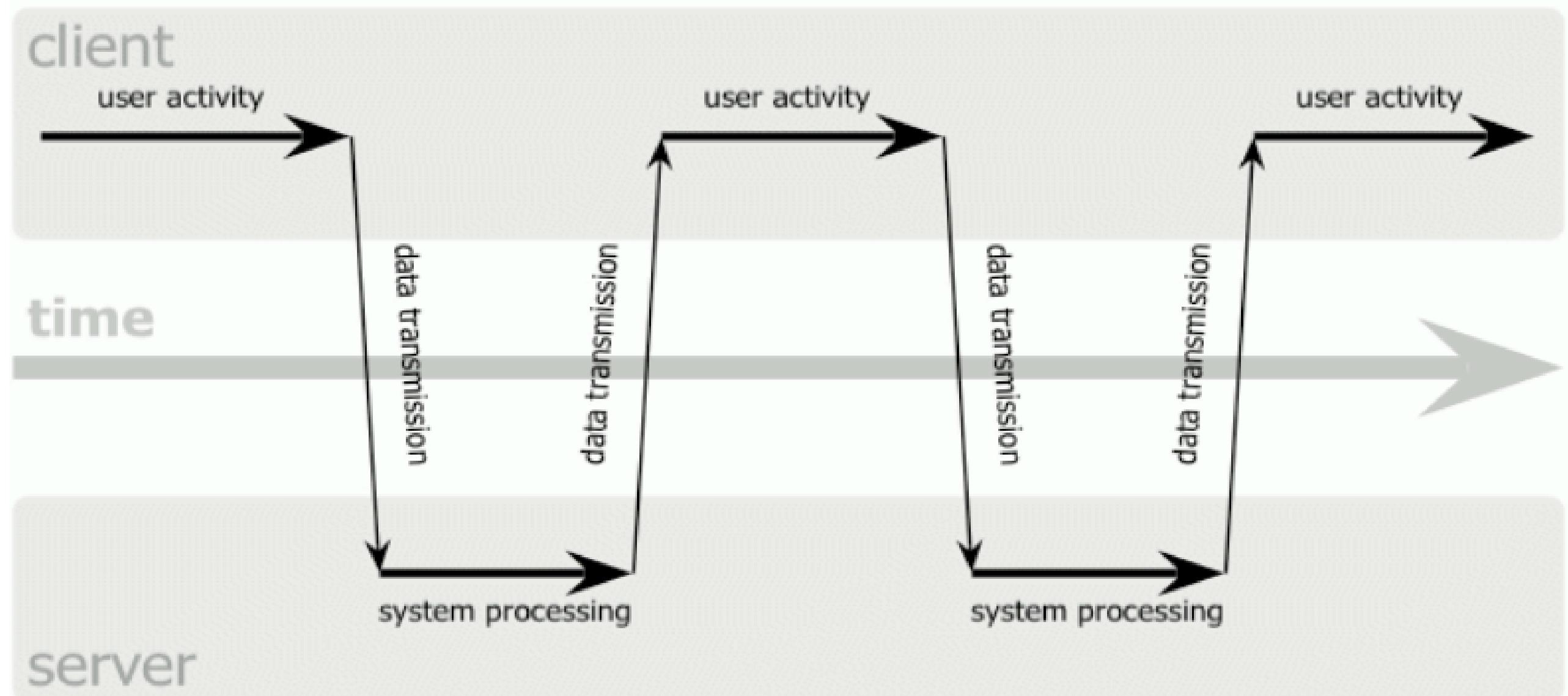


<https://codepen.io/juliangarnier/pen/krNqZO>



## Aplicação WEB Tradicional

classic web application model (synchronous)

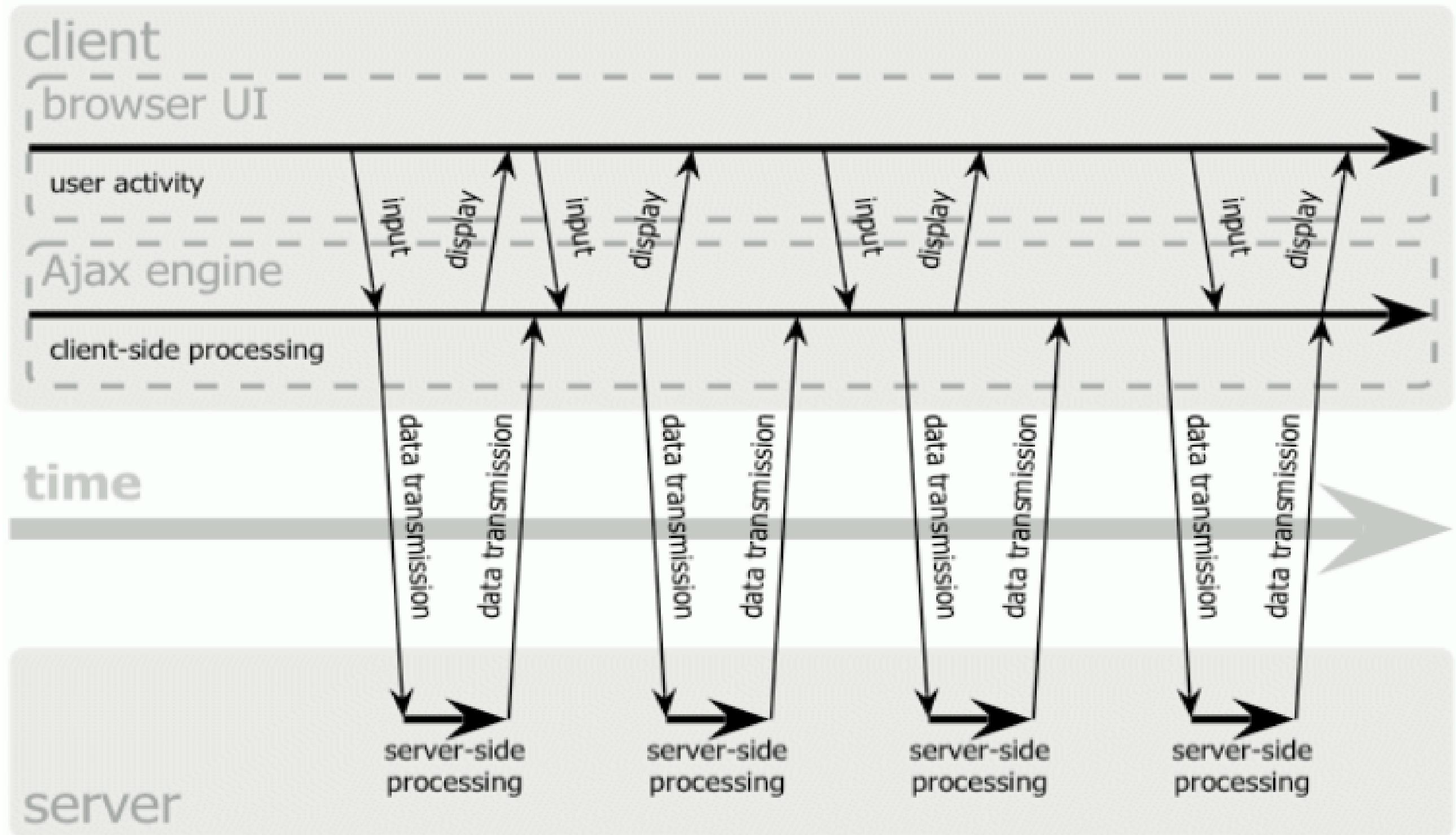


<http://adaptivepath.com/>



## AJAX

### Ajax web application model (asynchronous)

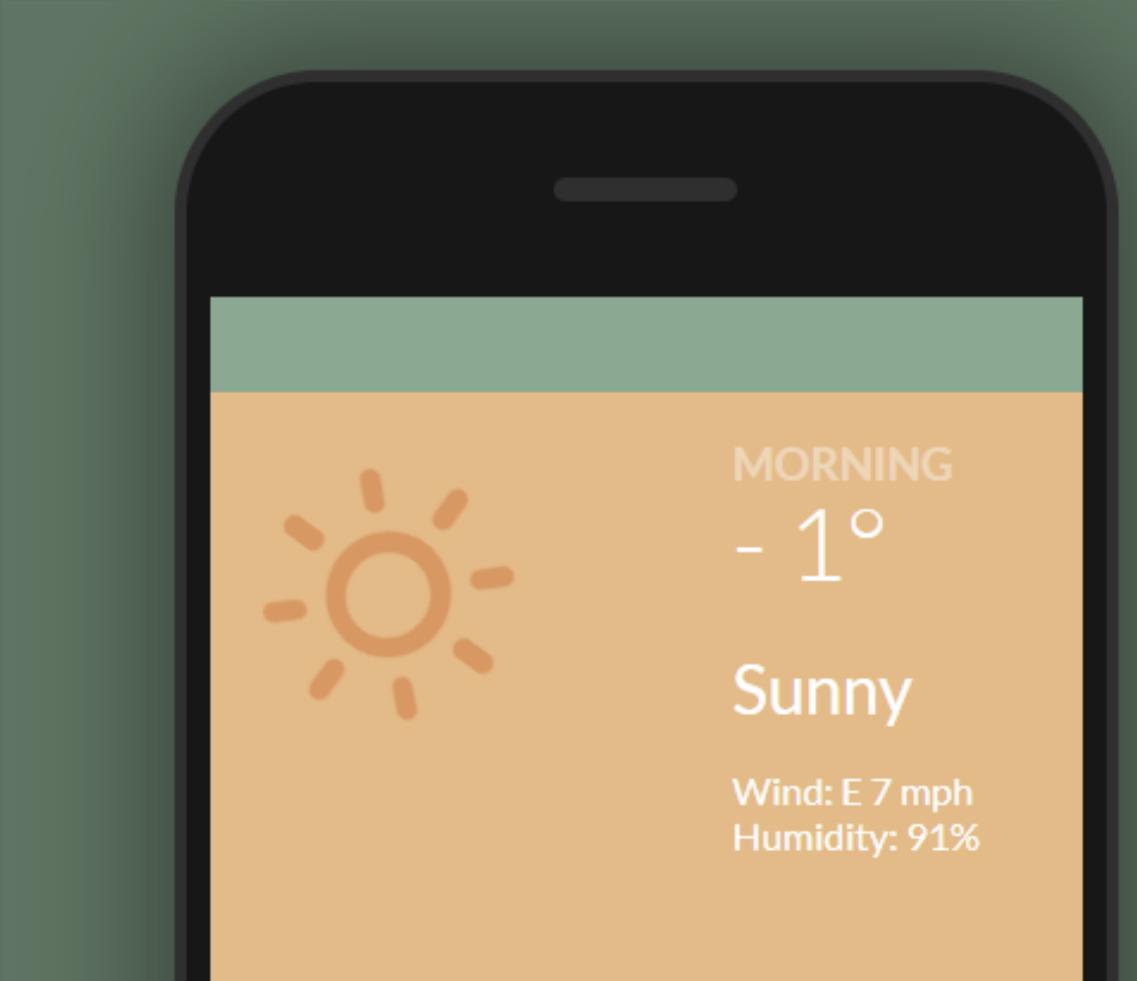




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Feito somente  
com CSS



## CSS-only Weather App Concept

Dribbble Rework

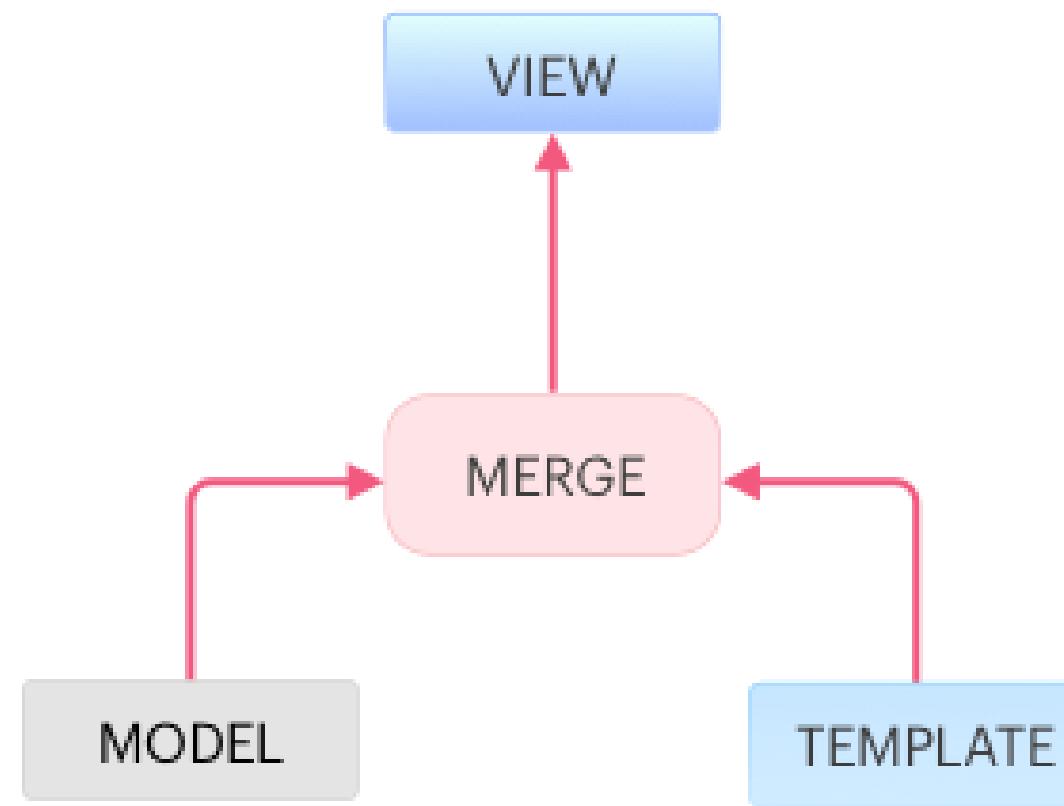
Original shot by [Sergey Valiukh](#)

Hover over each filter to see the effect.

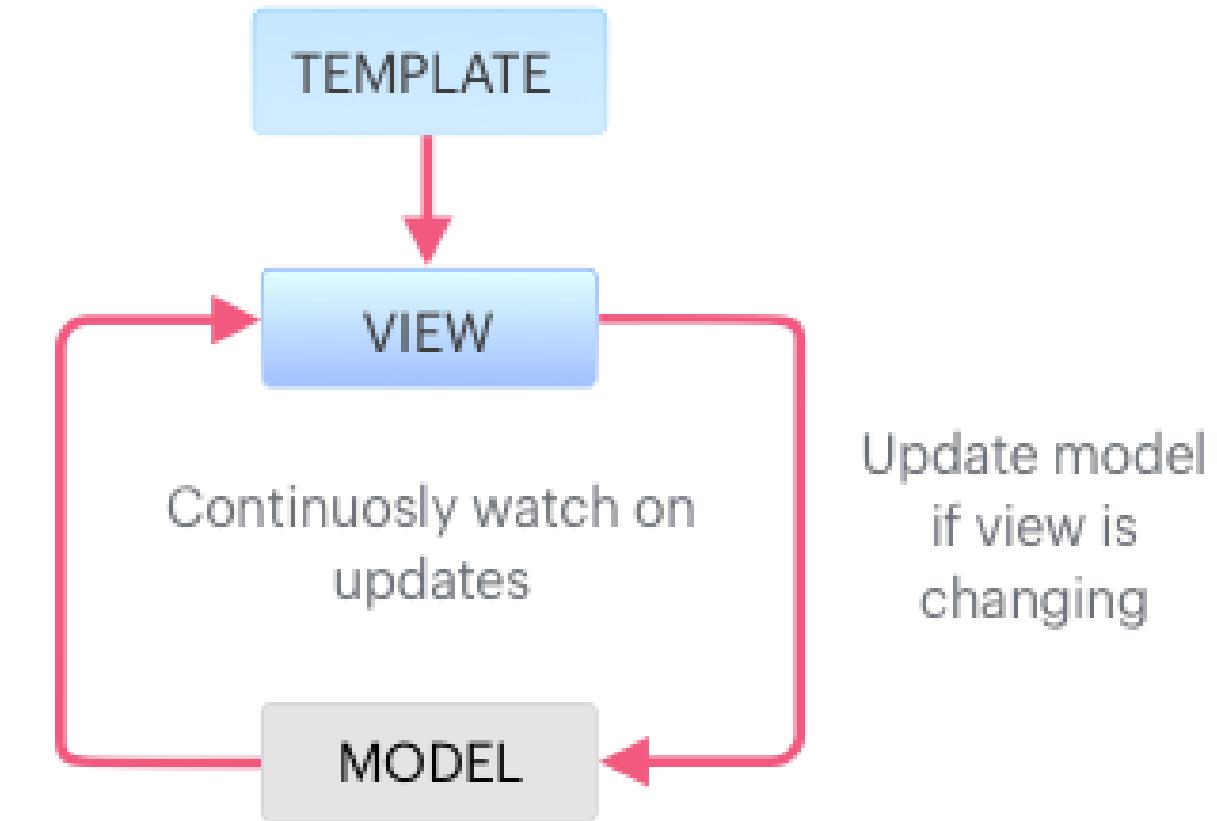
Works best in Chrome.

<https://codepen.io/davidkpiano/pen/ByNPQw>

# Data Binding



One-Way Data Binding



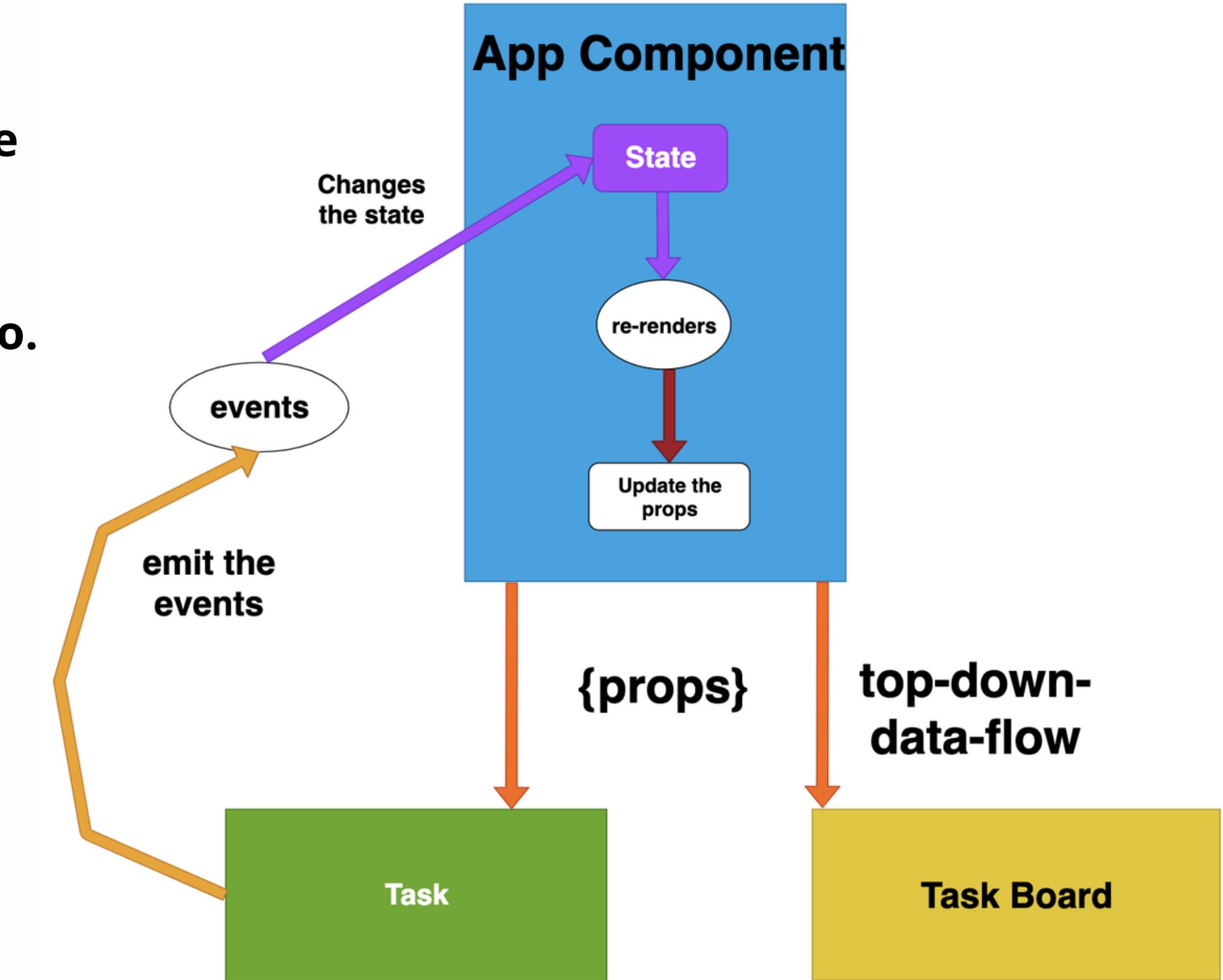
Two-Way Data Binding





## Lifting The State Up

Elevamos o estado a um ancestral comum dos componentes que precisam dele, para que todos possam compartilhar o estado. Isso nos permite compartilhar mais facilmente o estado entre todos esses componentes que precisam depender dele.





## Revisão Mostrando mensagem

```
// 1) Import the React and ReactDOM Libraries
import React from 'react';
import ReactDOM from 'react-dom/client';

// 2) Get a reference to the div with ID root
const el = document.getElementById('root');

// 3) Tell React to take control of that element
const root = ReactDOM.createRoot(el);

// 4) Create a component
function App() {
  const message = {};

  return <h1>{message}</h1>;
}

// 5) Show the component on the screen
root.render(<App />);
```

[https://github.com/naubergois/datasets/tree/master/ForReact/003\\_-\\_jsx](https://github.com/naubergois/datasets/tree/master/ForReact/003_-_jsx)



## Revisão Short Land Expression

```
// 1) Import the React and ReactDOM Libraries
import React from 'react';
import ReactDOM from 'react-dom/client';

// 2) Get a reference to the div with ID root
const el = document.getElementById('root');

// 3) Tell React to take control of that element
const root = ReactDOM.createRoot(el);

// 4) Create a component
function App() {
  return <h1>{new Date().toLocaleTimeString()}</h1>;
}

// 5) Show the component on the screen
root.render(<App />);
```

[https://github.com/naubergois/datasets/tree/master/ForReact/004\\_-jsx](https://github.com/naubergois/datasets/tree/master/ForReact/004_-jsx)



# Revisão Short Land Expression

```
// 1) Import the React and ReactDOM libraries
import React from 'react';
import ReactDOM from 'react-dom/client';

// 2) Get a reference to the div with ID root
const el = document.getElementById('root');

// 3) Tell React to take control of that element
const root = ReactDOM.createRoot(el);

// 4) Create a component
function App() {
  const name = 'Samantha';
  const age = 23;

  return (
    <h1>
      Hi, my name is {name} and my age is {age}
    </h1>
  );
}

// 5) Show the component on the screen
root.render(<App />);
```

[https://github.com/naubergois/datasets/tree/master/ForReact/007\\_-\\_jsx](https://github.com/naubergois/datasets/tree/master/ForReact/007_-_jsx)



## Revisão Short Land Expression

```
// 1) Import the React and ReactDOM libraries
import React from 'react';
import ReactDOM from 'react-dom/client';

// 2) Get a reference to the div with ID root
const el = document.getElementById('root');

// 3) Tell React to take control of that element
const root = ReactDOM.createRoot(el);

// 4) Create a component
function App() {
  return <input style={{ border: '3px solid red' }} type="number" min={5} />;
}

// 5) Show the component on the screen
root.render(<App />);
```

[https://github.com/naubergois/datasets/tree/master/ForReact/008\\_-\\_jsx](https://github.com/naubergois/datasets/tree/master/ForReact/008_-_jsx)



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## Solução com Estados

Title	Amount
<input type="text"/>	<input type="text"/>

Date

Filter by year

August 2020 14	Toilet Paper	\$94.12 <input type="button" value="Change Title"/>
March 2021 12	New TV	\$799.49 <input type="button" value="Change Title"/>
March 2021 28	Car Insurance	\$294.67 <input type="button" value="Change Title"/>
June 2021 12	New Desk (Wooden)	\$450 <input type="button" value="Change Title"/>

<https://github.com/naubergois/datasets/tree/master/ForReact/08-assignment-solution>

# Props vs. State

- ★ Immutable
- ★ Has better performance
- ★ Can be passed to child components

{ }

---

- ★ Owned by its component
- ★ Locally scoped
- ★ Writeable / Mutable
- ★ Has `setState()` method to modify properties
- ★ Changes to state can be asynchronous
- ★ Can only be passed as props

---



## Solução com Estados

```
import './ExpenseForm.css';

const ExpenseForm = (props) => {
  const [enteredTitle, setEnteredTitle] = useState('');
  const [enteredAmount, setEnteredAmount] = useState('');
  const [enteredDate, setEnteredDate] = useState('');
  // const [userInput, setUserInput] = useState({
  //   enteredTitle: '',
  //   enteredAmount: '',
  //   enteredDate: '',
  // });
}
```

<https://github.com/naubergois/datasets/tree/master/ForReact/01-using-stateful-lists>



## React Keys

# Introduction to React Keys

**Key em React js é usada para identificar exclusivamente um item, especialmente no caso do componente de reação dinâmica, será muito útil identificar componentes dinâmicos e também é usado quando queremos identificar a alteração em um item como o update, delete , etc**

<https://github.com/naubergois/datasets/tree/master/ForReact/02-understanding-keys>

<https://cmichel.io/react-fun-with-keys/>



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## Solução Completa

Title	Amount
<input type="text"/>	<input type="text"/>

Date

Filter by year

<b>March 2021 12</b>	New TV	<b>\$799.49</b>
<b>March 2021 28</b>	Car Insurance	<b>\$294.67</b>
<b>June 2021 12</b>	New Desk (Wooden)	<b>\$450</b>

<https://github.com/naubergois/datasets/tree/master/ForReact/03-assignment-1-solution>



## Conteúdo Condicional

```
import React from 'react';

import './ExpensesFilter.css';

const ExpensesFilter = (props) => {
  const dropdownChangeHandler = (event) => {
    props.onChangeFilter(event.target.value);
  };

  return (
    <div className='expenses-filter'>
      <div className='expenses-filter__control'>
        <label>Filter by year</label>
        <select value={props.selected} onChange={dropdownChangeHandler}>
          <option value='2022'>2022</option>
          <option value='2021'>2021</option>
          <option value='2020'>2020</option>
          <option value='2019'>2019</option>
        </select>
      </div>
    </div>
  );
};

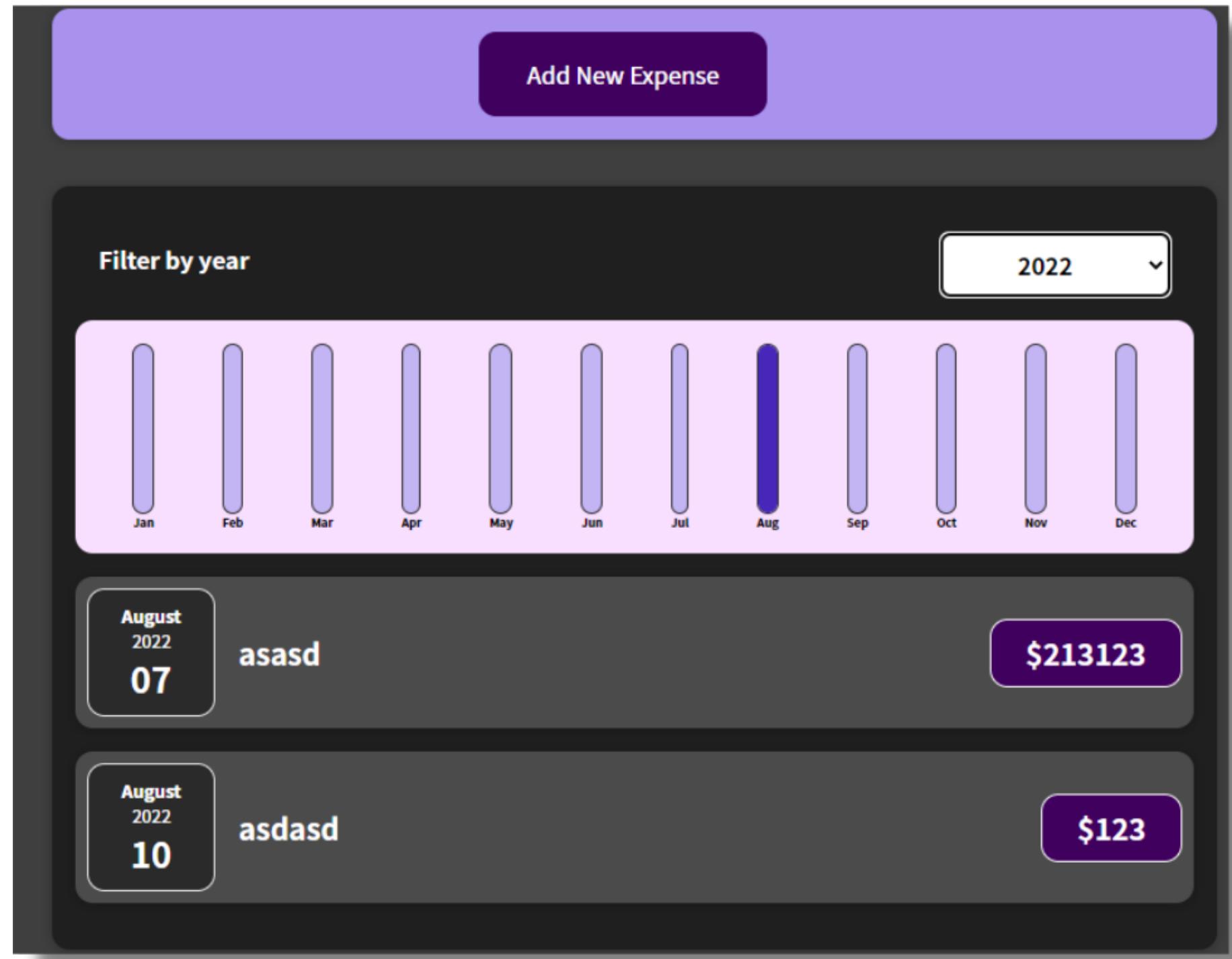
export default ExpensesFilter;
```



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## Solução Completa



<https://github.com/naubergois/datasets/tree/master/ForReact/06-finished>



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Trabalhando  
com Dados



**STREAMLIT:**  
**The fastest way to build Data apps**



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## Streamlit

# What is Streamlit?

Allows you to quickly build web applications in Python

```
intro.py  x
 1 import streamlit as st
 2 import pandas as pd
 3 import plotly.express as px
 4 import matplotlib.pyplot as plt
 5 import seaborn as sns
 6
 7 st.title("Show me some penguins!")
 8
 9 species = st.radio("Select a penguin", ["adelie", "gentoo", "chinstrap"])
10
11 st.image(f"{species}.jpg")
12
13 species_to_wiki = {
14     'adelie
```

localhost:8501

Show me some penguins!

Select a penguin

- adelie
- gentoo
- chinstrap





# Streamlit

# Plotting In Streamlit

	Week	C	Bash	BASIC	COBOL	Ruby	Rust	R	Obje	Nim	C#	Python	Java	Java	Jul
0	2015-05-31	84	17	15	3	16	1	45	4	1	93	25	43	99	
1	2015-06-07	86	17	15	3	16	1	45	5	1	94	25	44	100	
2	2015-06-14	85	17	15	3	16	1	44	5	1	93	24	44	99	
3	2015-06-21	84	17	14	3	15	1	43	4	1	93	25	44	96	
4	2015-06-28	83	16	13	3	16	1	43	4	1	89	24	41	96	

```
# Core Pkgs
import streamlit as st

# Load EDA Pkgs
import pandas as pd
import numpy as np

def main():
    st.title("Plotting In Streamlit")
    # Load Dataset
    # df = pd.read_csv("data/iris.csv")
    df = pd.read_csv("data/lang_data.csv")
    st.dataframe(df.head())

    # Plotting with Plotly
```



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## Streamlit

# Plotting In Streamlit with Plotly

	Unnamed: 0	lang	Sum
0	BASIC	BASIC	2456
1	COBOL	COBOL	616
2	Ruby	Ruby	3217
3	Rust	Rust	518
4	R	R	12020
5	Objective-C	Objective-C	813
6	Nim	Nim	260
7	C#	C#	21268
8	Python	Python	11352
9	JavaScript	JavaScript	11450

[https://github.com/naubergois/datasets/blob/master/ForStreamlit/course\\_materials\\_learnstreamlit/LearnStreamlit/Module01/Fundamentals\\_of\\_Streamlit/app\\_02.py](https://github.com/naubergois/datasets/blob/master/ForStreamlit/course_materials_learnstreamlit/LearnStreamlit/Module01/Fundamentals_of_Streamlit/app_02.py)



## Streamlit

# Multi Element Container in Streamlit

Multiple elements out of order

From Inside Container 1

From Inside Container

Please replace `st.beta_container` with `st.container`.

`st.beta_container` will be removed after 2021-11-02.

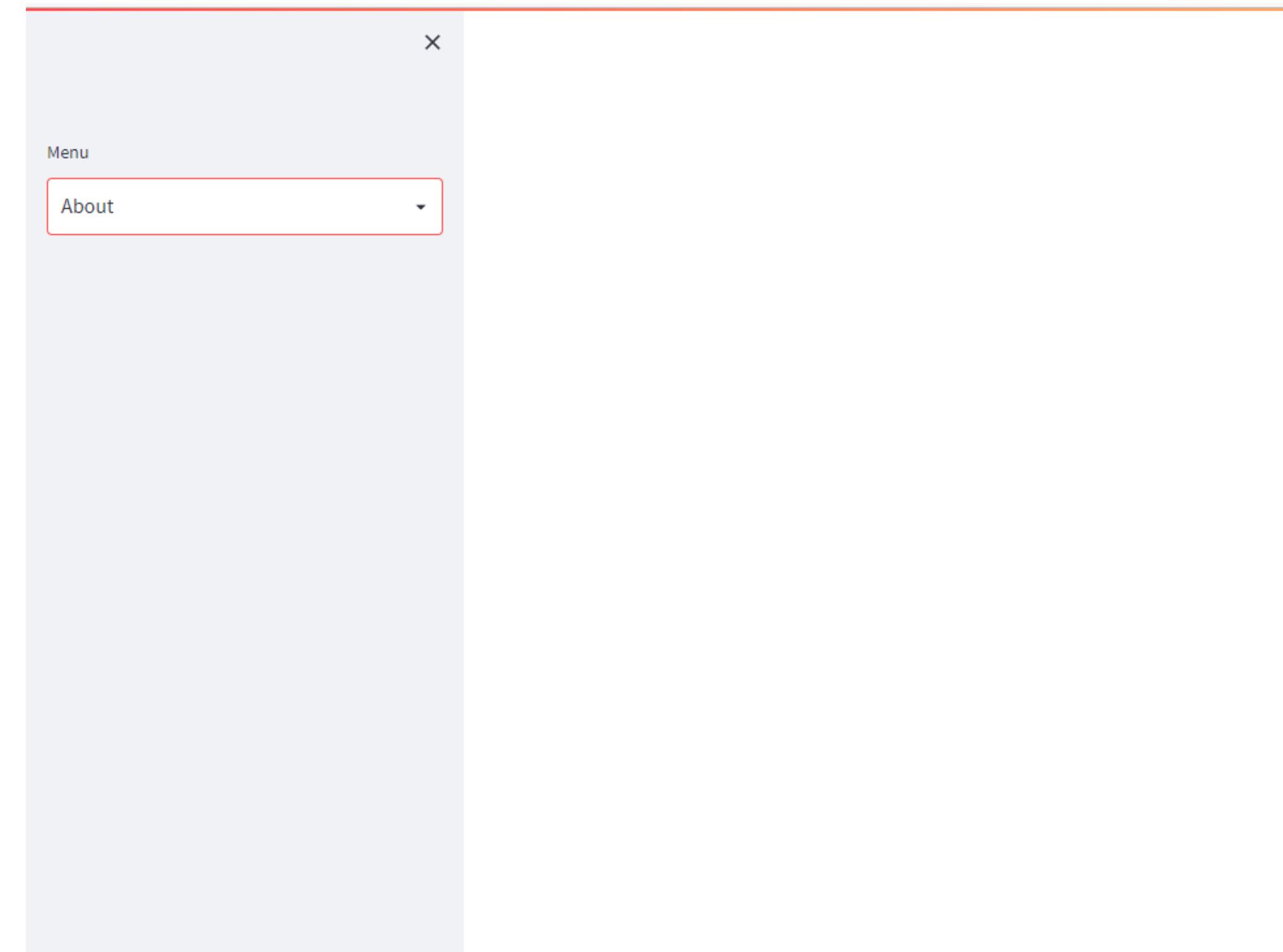
From Outside Container



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# Streamlit



[https://github.com/naubergois/datasets/tree/master/ForStreamlit/course\\_materials\\_learnstreamlit/LearnStreamlit/Module01/Fundamentals\\_of\\_Streamlit](https://github.com/naubergois/datasets/tree/master/ForStreamlit/course_materials_learnstreamlit/LearnStreamlit/Module01/Fundamentals_of_Streamlit)



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## Streamlit

### Display Data

```
▼ {  
  "data" : "name"  
}  
  
def sayhello():  
    print("Hello Streamlit Lovers")
```



## Streamlit

## Display Text

Normal Text

# This is a markdown text

3

- ▶ [ 0 - 100 ]
- ▶ [ 100 - 189 ]

builtins.range

---

range(stop) → range object

range(start, stop[, step]) → range object

Return an object that produces a sequence of integers from start (inclusive) to stop (exclusive) by step. range(i, j) produces i, i+1, i+2, ..., j-1. start defaults to 0, and stop is omitted! range(4) produces 0, 1, 2, 3.

These are exactly the valid indices for a list of 4 elements.  
When step is given, it specifies the increment (or decrement).



## Streamlit

## Build a Form with Layout

# Layout in Streamlit

## Exercise: Build A Simple Form

Firstname

Lastname

Age

- +

Date of Birth

Message

Contact Address

Press Enter to apply

Please replace `st.beta_columns` with `st.columns`.

`st.beta_columns` will be removed after 2021-11-02.

Your name is qweqwe, qweqwe and you were born on 2022-08-08. You said 123123



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Altair



## Declarative Visualization in Python



<https://colab.research.google.com/drive/1FzJ44hOhxNeM2Xn5pAoKi4xJ-JGzveVU?usp=sharing>



## Streamlit

### Layout 1

# Layout in Streamlit

Full Length Wide Layout

Col1

Col2

From Col1

From col2

Firstname

Please replace `st.beta_columns` with `st.columns`.

`st.beta_columns` will be removed after 2021-11-02.

From C1 3x larger

From C2: less

Please replace `st.beta_columns` with `st.columns`.

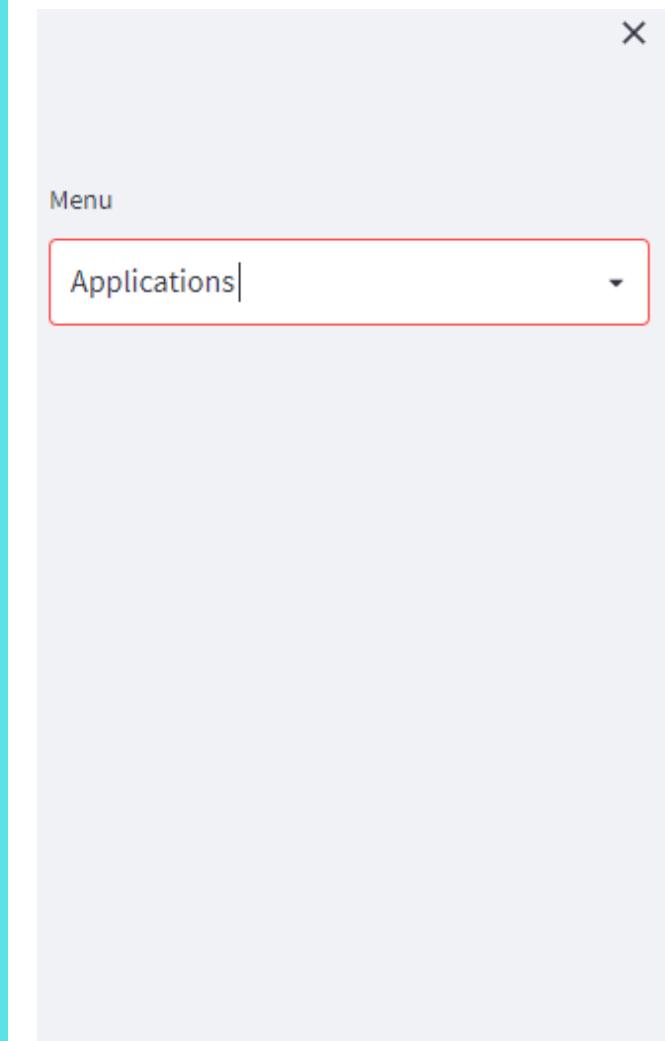


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## Streamlit

## App Structure



**Streamlit is Awesome**

[https://github.com/naubergois/datasets/tree/master/ForStreamlit/course\\_materials\\_learnstreamlit/LearnStreamlit/Module01/Fundamentals\\_of\\_Streamlit](https://github.com/naubergois/datasets/tree/master/ForStreamlit/course_materials_learnstreamlit/LearnStreamlit/Module01/Fundamentals_of_Streamlit)



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## Streamlit

### Buttons 01

Julia

hello Julia

Please replace `st.beta_expander` with `st.expander`.

`st.beta_expander` will be removed after 2021-11-02.



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## Streamlit

## File Uploader

Upload Files



Drag and drop file here

Limit 200MB per file • TXT, PDF, DOCX, CSV

[Browse files](#)

Select File Type

txt

[Submit](#)

[https://github.com/naubergois/datasets/tree/master/ForStreamlit/course\\_materials\\_learnstreamlit/LearnStreamlit/Module01/Fundamentals\\_of\\_Streamlit](https://github.com/naubergois/datasets/tree/master/ForStreamlit/course_materials_learnstreamlit/LearnStreamlit/Module01/Fundamentals_of_Streamlit)



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## Streamlit

## Media File



Sempre traduzir página

Traduzir



[https://github.com/naubergois/datasets/tree/master/ForStreamlit/course\\_materials\\_learnstreamlit/LearnStreamlit/Module01/Fundamentals\\_of\\_Streamlit](https://github.com/naubergois/datasets/tree/master/ForStreamlit/course_materials_learnstreamlit/LearnStreamlit/Module01/Fundamentals_of_Streamlit)

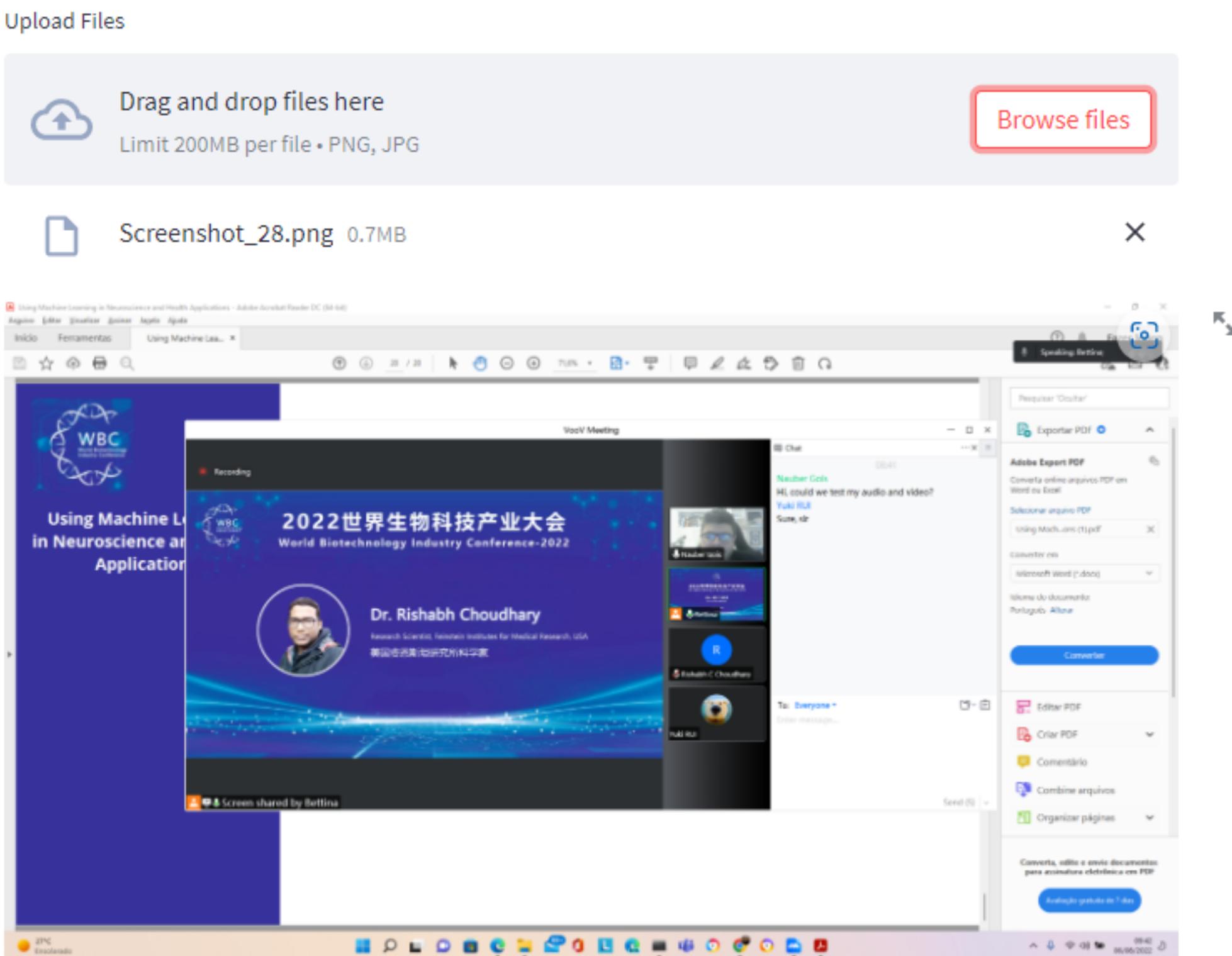


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# Streamlit

# Multiple Files



[https://github.com/naubergois/datasets/tree/master/ForStreamlit/course\\_materials\\_learnstreamlit/LearnStreamlit/Module01/Fundamentals\\_of\\_Streamlit](https://github.com/naubergois/datasets/tree/master/ForStreamlit/course_materials_learnstreamlit/LearnStreamlit/Module01/Fundamentals_of_Streamlit)



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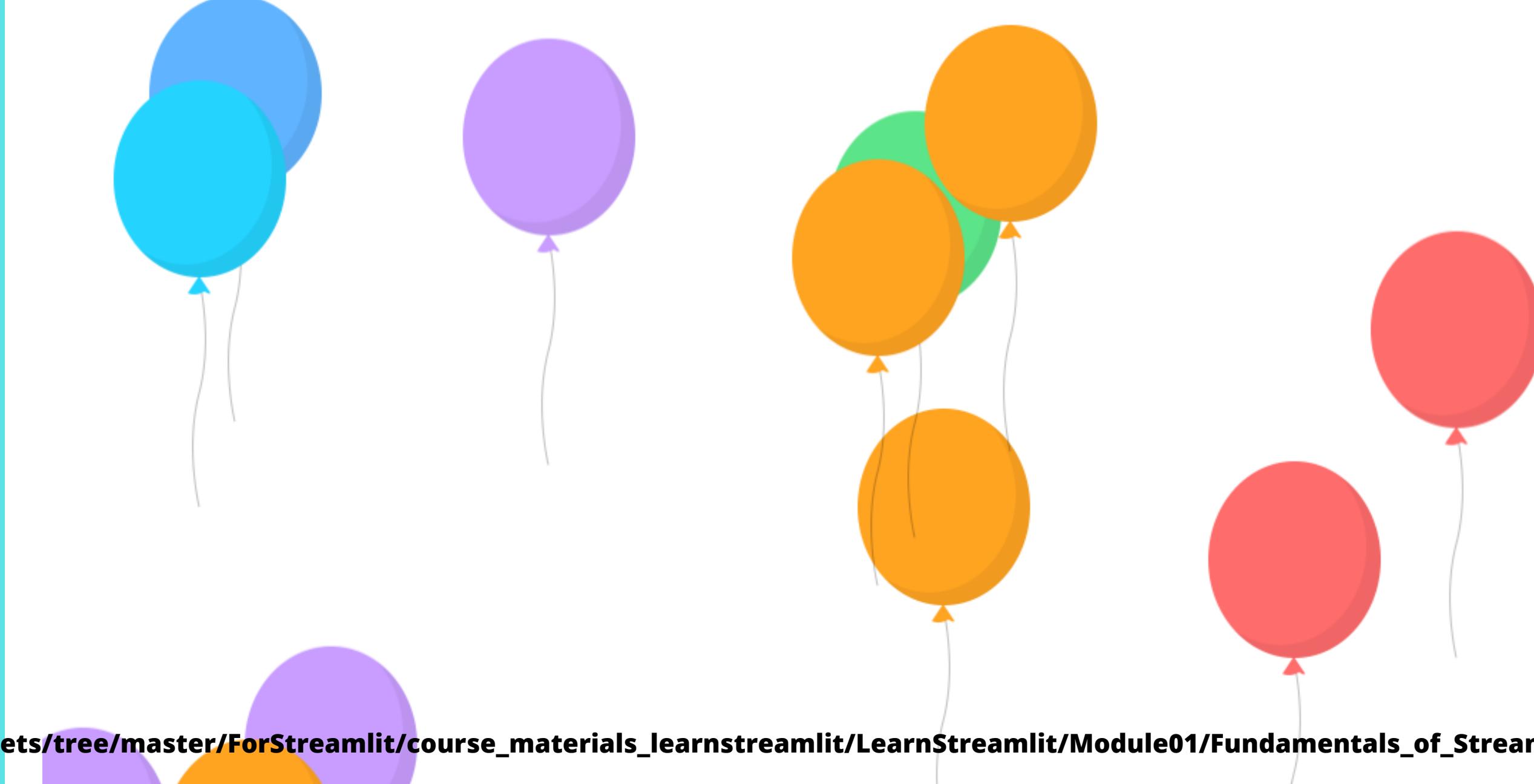


Streamlit

Progress Bar

## Progress Bar and Spinner & Balloons

Submit



[https://github.com/naubergois/datasets/tree/master/ForStreamlit/course\\_materials\\_learnstreamlit/LearnStreamlit/Module01/Fundamentals\\_of\\_Streamlit](https://github.com/naubergois/datasets/tree/master/ForStreamlit/course_materials_learnstreamlit/LearnStreamlit/Module01/Fundamentals_of_Streamlit)



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## Streamlit

## Select

Language

Python

You selected Python

Spoken Lang

English ×



Age

1  
●

1

100

Choose Color

yellow

yellow

red

red

white



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## Streamlit

### Text Input

Enter Firsname

Enter Password

Enter Message

Enter Number

Appointment

My Time



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ser  
educacional

## Streamlit

## Altair Chart

### Example

```
import pandas as pd
import numpy as np
import altair as alt

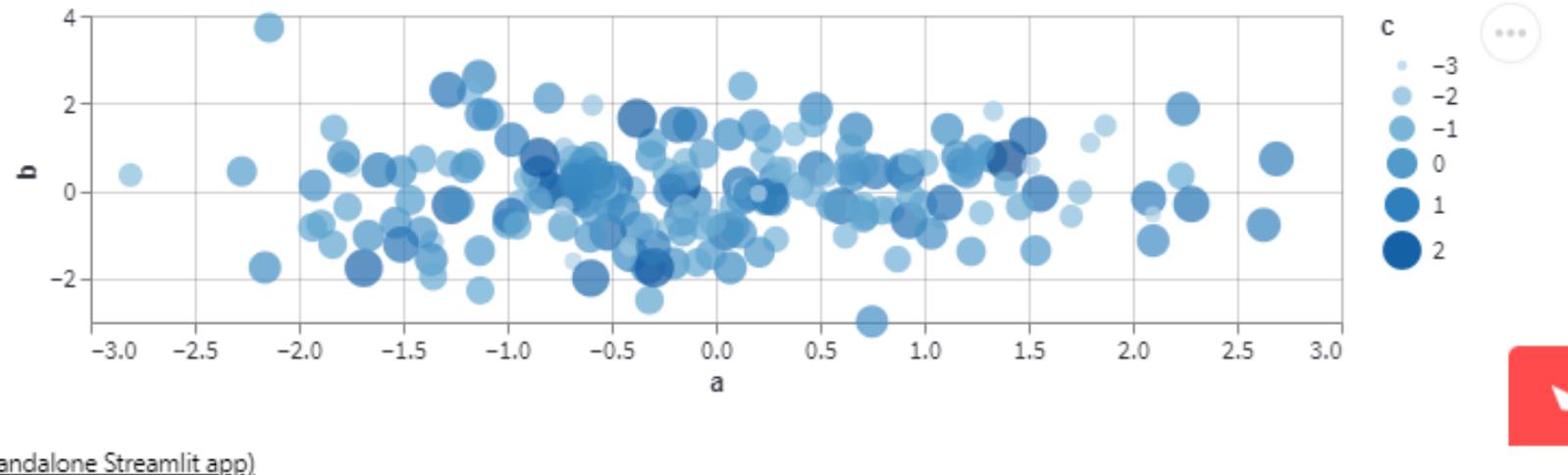
df = pd.DataFrame(
    np.random.randn(200, 3),
    columns=['a', 'b', 'c'])

c = alt.Chart(df).mark_circle().encode(
    x='a', y='b', size='c', color='c', tooltip=['a', 'b', 'c'])

st.altair_chart(c, use_container_width=True)
```

CC

Examples of Altair charts can be found at <https://altair-viz.github.io/gallery/>.



(view standalone Streamlit app)

[https://docs.streamlit.io/library/api-reference/charts/st.altair\\_chart](https://docs.streamlit.io/library/api-reference/charts/st.altair_chart)



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## Streamlit

## Altair Chart

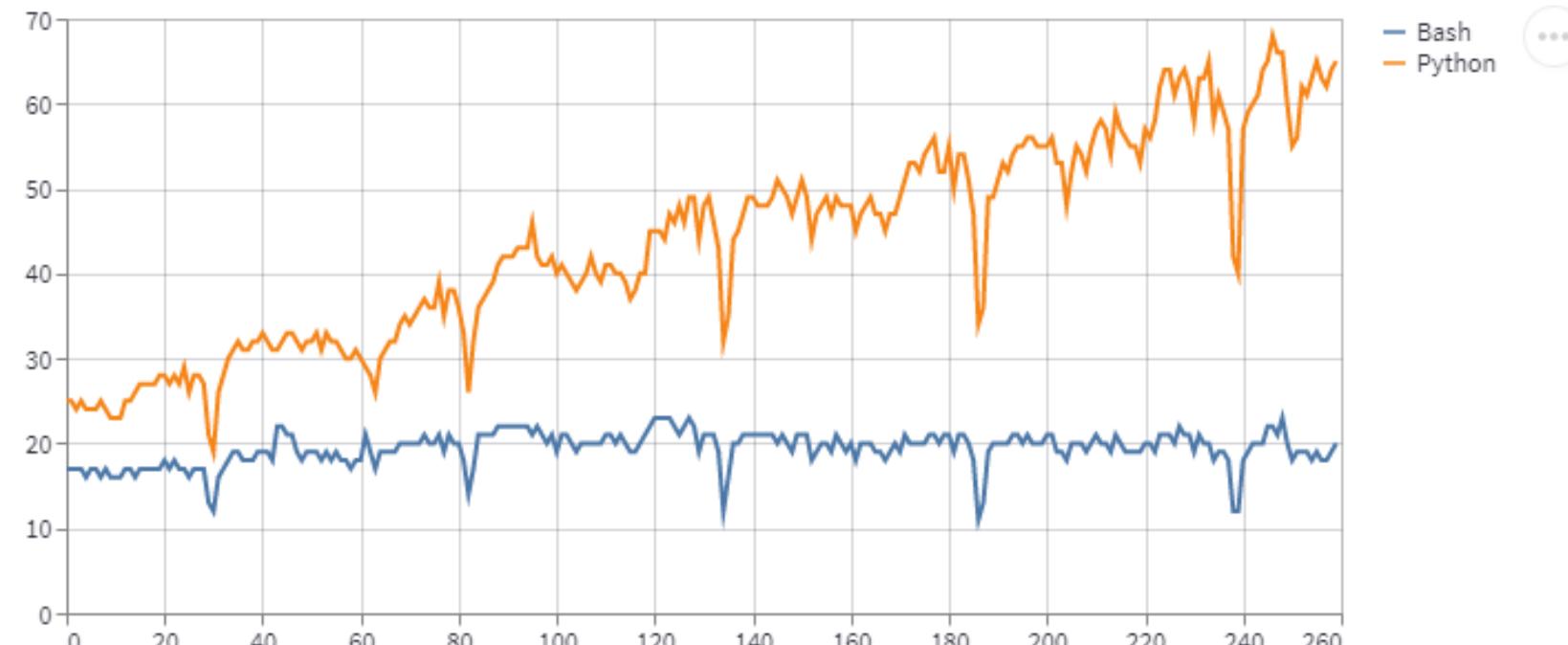
# Plotting In Streamlit

	Week	C	Bash	BASIC	COBOL	Ruby	Rust	R	Obje	Nim	C#	Python	Java	Java	Jul
0	2015-05-31	84	17	15	3	16	1	45	4	1	93	25	43	99	
1	2015-06-07	86	17	15	3	16	1	45	5	1	94	25	44	100	
2	2015-06-14	85	17	15	3	16	1	44	5	1	93	24	44	99	
3	2015-06-21	84	17	14	3	15	1	43	4	1	93	25	44	96	
4	2015-06-28	83	16	13	3	16	1	43	4	1	89	24	41	96	

Choose Language

Python ✕

Bash ✕



[https://github.com/naubergois/datasets/tree/master/ForStreamlit/course\\_materials\\_learnstreamlit/LearnStreamlit/Module02](https://github.com/naubergois/datasets/tree/master/ForStreamlit/course_materials_learnstreamlit/LearnStreamlit/Module02)



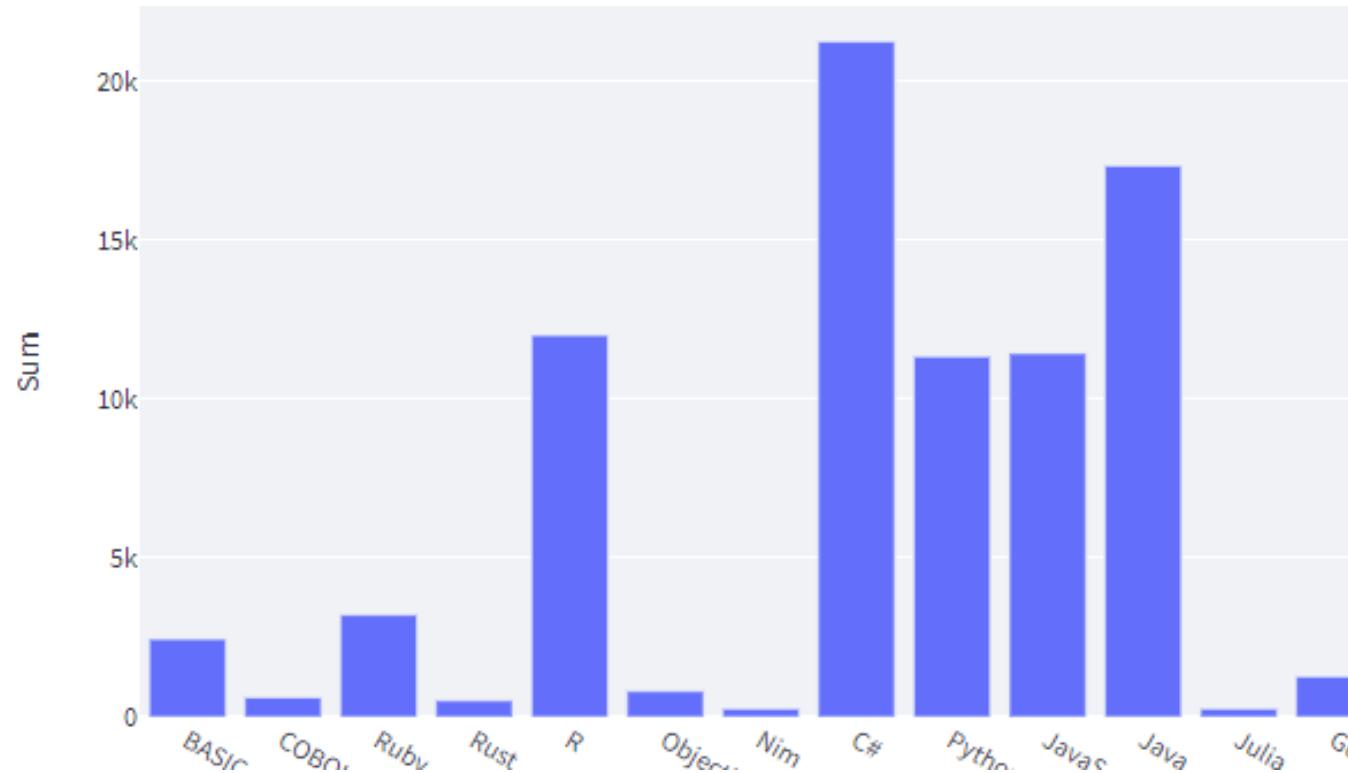
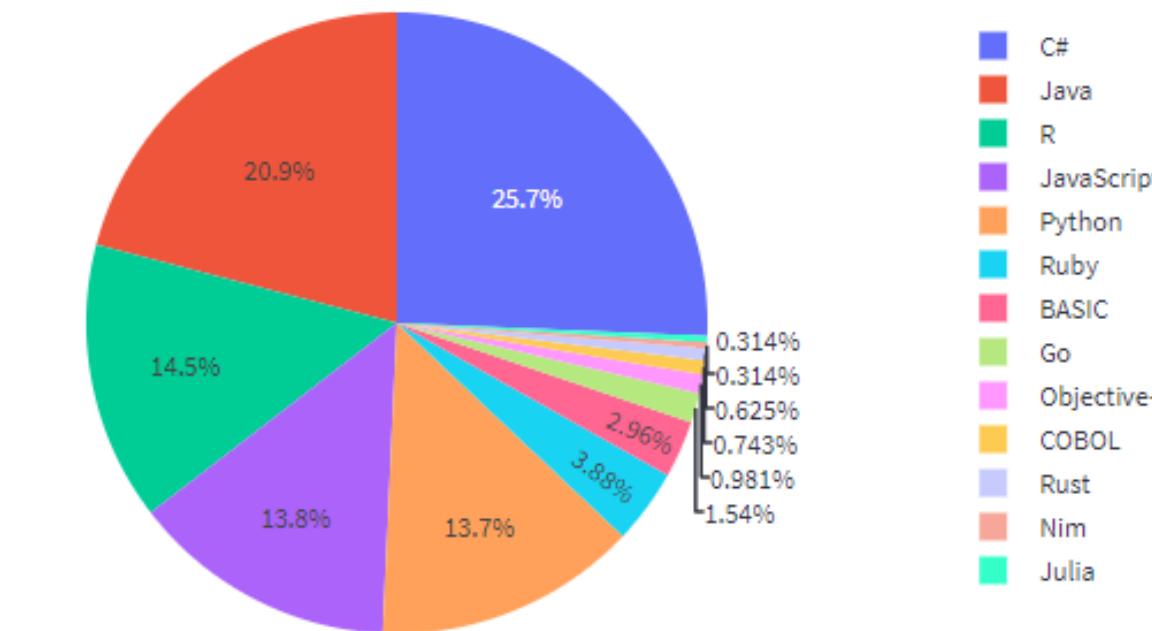
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# Streamlit

# Plotly

Pie Chart of Languages





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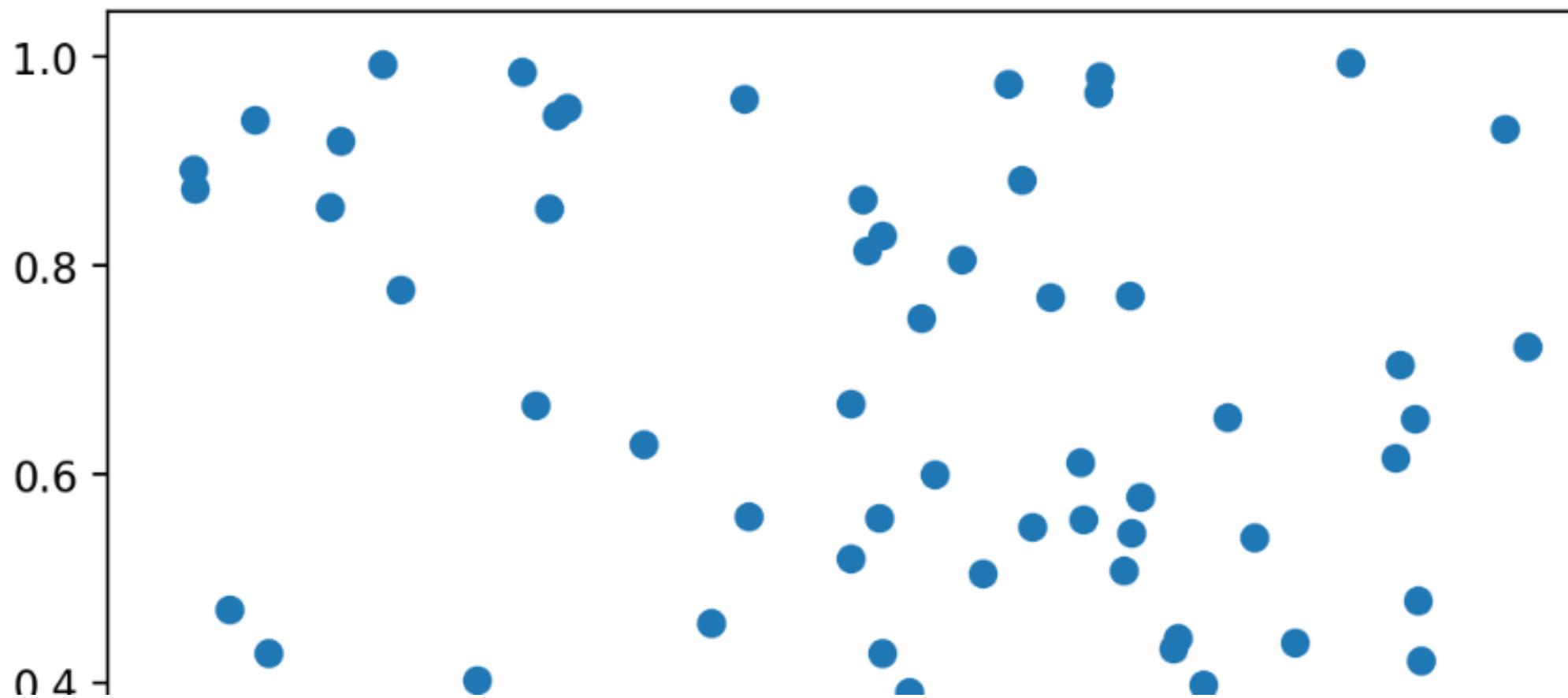


**Streamlit**

**St.PyPlot**

# Plotting with St.Pyplot

	sepal_length	sepal_width	petal_length	petal_width	species
0	5.1000	3.5000	1.4000	0.2000	setosa
1	4.9000	3.0000	1.4000	0.2000	setosa
2	4.7000	3.2000	1.3000	0.2000	setosa
3	4.6000	3.1000	1.5000	0.2000	setosa
4	5.0000	3.6000	1.4000	0.2000	setosa



**Streamlit****Components****app.py**

# Caching In Streamlit

Start:{}

	sepal_length	sepal_width	petal_length	petal_width	species
22	4.6000	3.6000	1.0000	0.2000	setosa
23	5.1000	3.3000	1.7000	0.5000	setosa
24	4.8000	3.4000	1.9000	0.2000	setosa
25	5.0000	3.0000	1.6000	0.2000	setosa
26	5.0000	3.4000	1.6000	0.4000	setosa
27	5.2000	3.5000	1.5000	0.2000	setosa
28	5.2000	3.4000	1.4000	0.2000	setosa
29	4.7000	3.2000	1.6000	0.2000	setosa
30	4.8000	3.1000	1.6000	0.2000	setosa
31	5.4000	3.4000	1.5000	0.4000	setosa
32	5.2000	4.1000	1.5000	0.1000	setosa



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## Streamlit

## Components

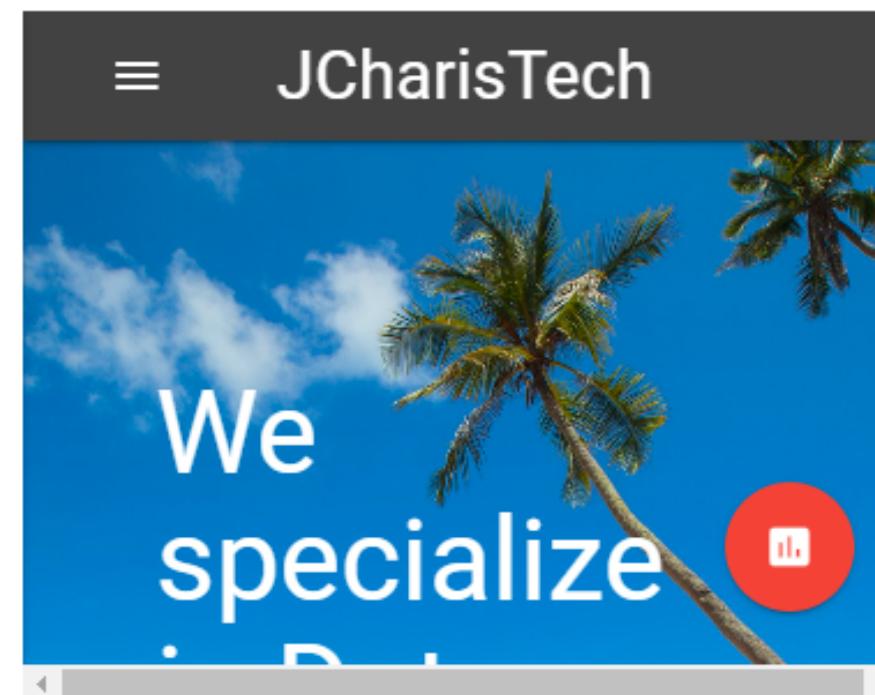
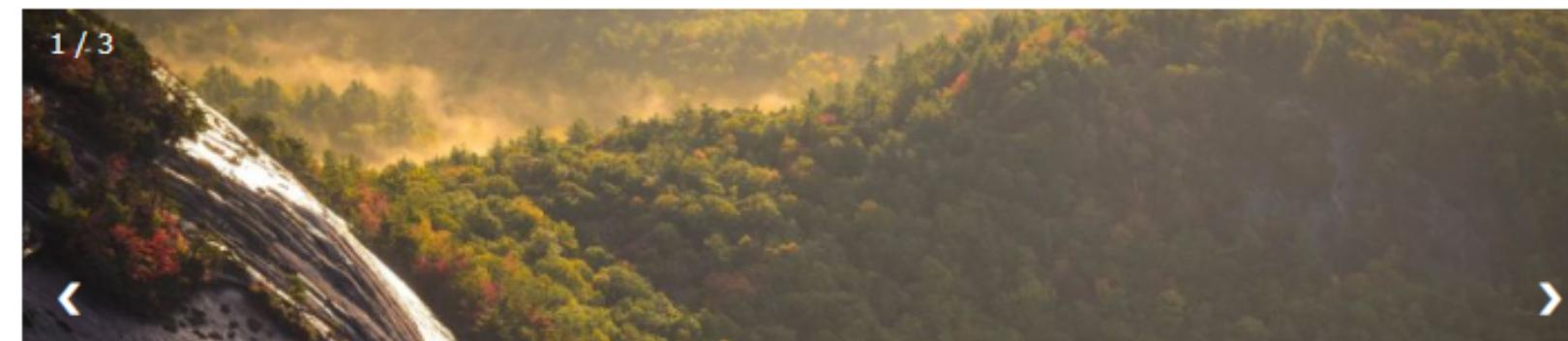
## Static Components

# Streamlit Static Components Tut

Streamlit is Awesome

Streamlit is Awesome

From W3Schools



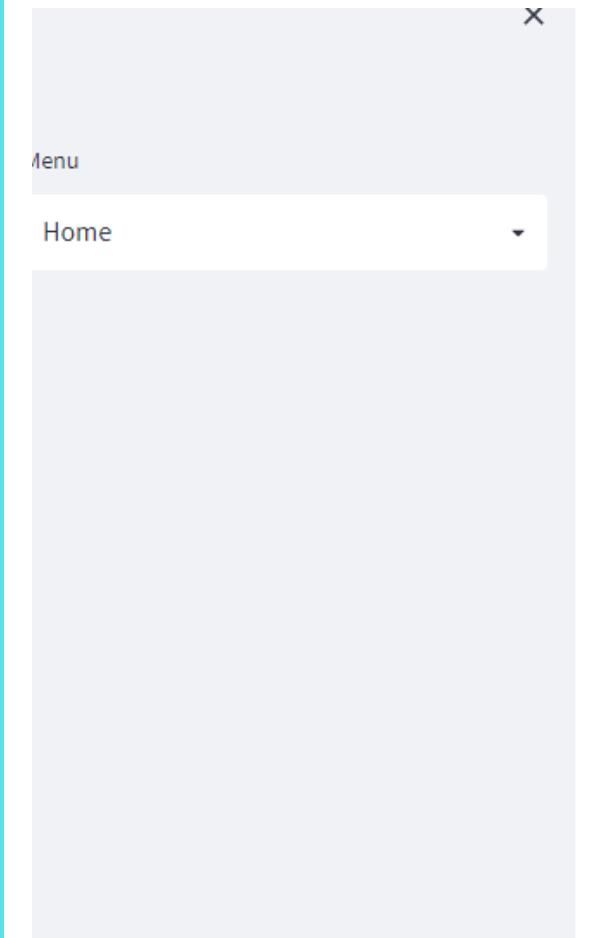


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## Streamlit

## File Upload App



## File Upload Tutorial

### Home

Upload Images



Drag and drop file here

Limit 200MB per file • PNG, JPG, JPEG

Browse files

[https://github.com/naubergois/datasets/tree/master/ForStreamlit/course\\_materials\\_learnstreamlit/LearnStreamlit/Module03](https://github.com/naubergois/datasets/tree/master/ForStreamlit/course_materials_learnstreamlit/LearnStreamlit/Module03)



- Definições de Padrões de Projeto

- *"Cada padrão descreve um problema que se repete várias vezes em um determinado meio, e em seguida descreve o âmago da sua solução, de modo que esta solução possa ser usada milhares e milhares de vezes"*

**ALEXANDER, C., ISHIKAWA, S., SILVERSTEIN, M., JACOBSON, M., FIKSDAHL-KING, I., ANGEL, S.** "A Pattern Language". New York, NY (USA): Oxford University Press, 1977.

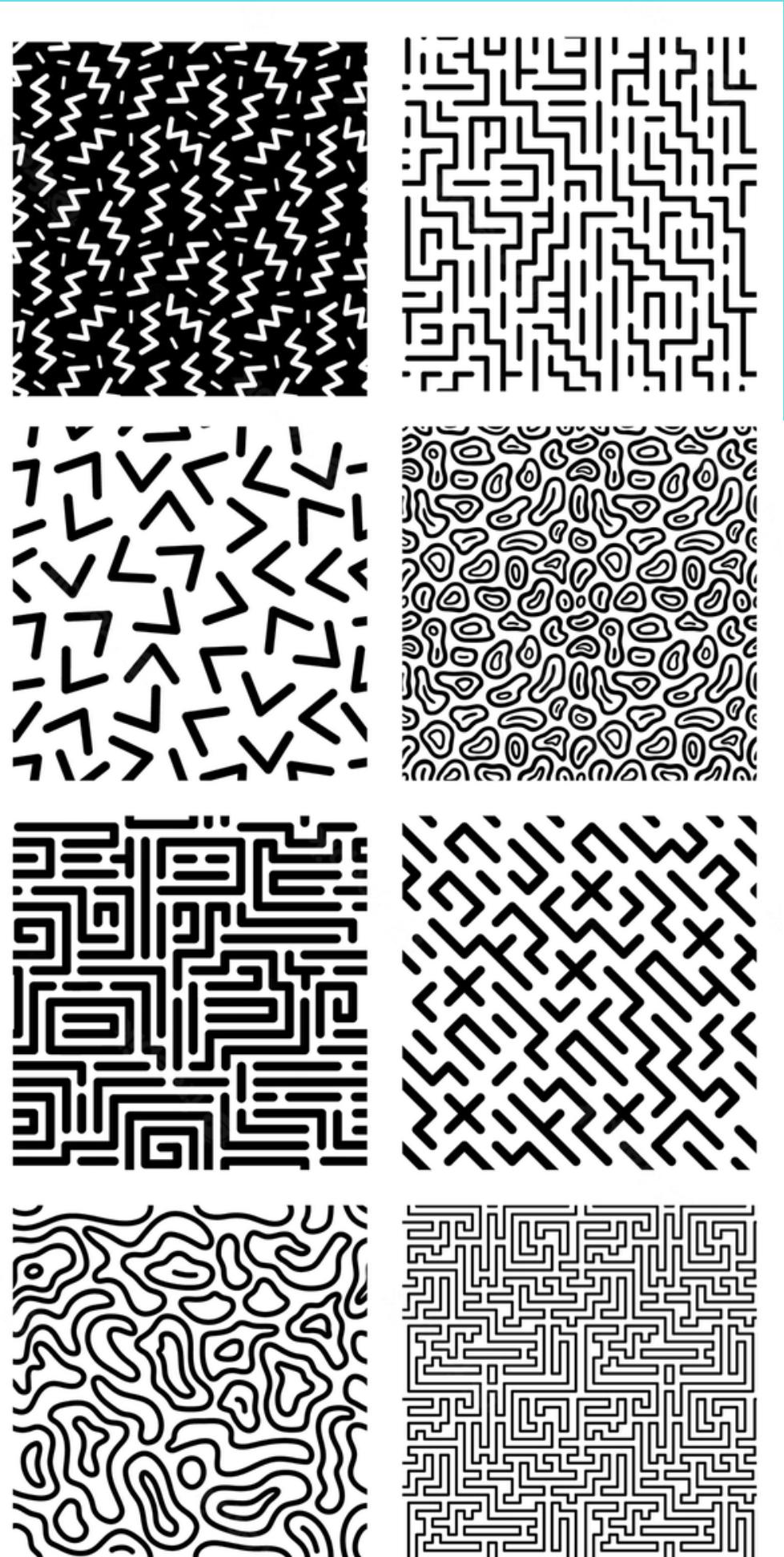
- *"Um padrão de projeto sistematicamente nomeia, motiva e explica um projeto genérico, que endereça um problema de projeto recorrente em sistemas orientados a objetos. Ele descreve o problema, a solução, quando é aplicável e quais as consequências de seu uso."*

**GAMMA, E., HELM, R., JOHNSON, R., VLISSIDES, J.** "Design Patterns: Elements of Reusable Object-Oriented Software". Reading, MA: Addison Wesley, 1995.



## Padrões de Projeto

- Os padrões de projeto beneficiam os desenvolvedores de um sistema
  - Ajudando a construir um software confiável com arquiteturas testada e perícia acumulada pela indústria
  - Promovendo a reutilização de projetos em futuros sistemas
    - Permitem compartilhar experiências bem sucedidas na resolução de problemas recorrentes.
  - Ajudando a identificar equívocos comuns e armadilhas que ocorrem na construção dos sistemas
  - Estabelecendo um vocabulário comum de projeto entre os desenvolvedores
  - Encurtando a fase de projeto no processo de desenvolvimento de um software
    - Permitem que os desenvolvedores concentrem seus esforços nos aspectos inéditos do problema.





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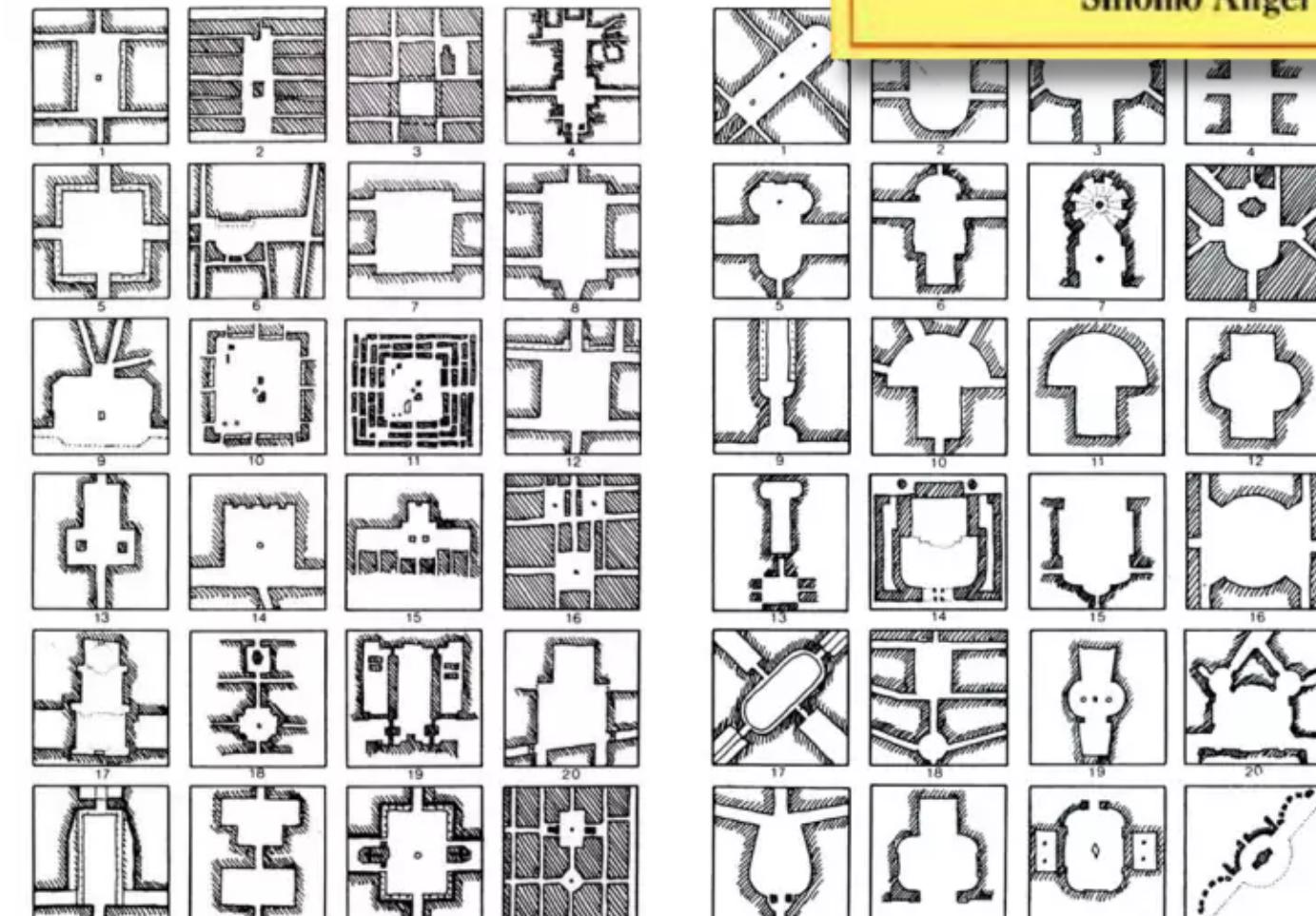
## Padrões de Projeto

A Pattern Language: Towns, Buildings, Construction é um livro de 1977 sobre arquitetura, design urbano e habitabilidade comunitária. Foi de autoria de Christopher Alexander, Sara Ishikawa e Murray Silverstein do Centro de Estrutura Ambiental de Berkeley, Califórnia, com créditos de escrita também para Max Jacobson, Ingrid Fiksdahl-King e Shlomo Angel. Décadas após sua publicação, ainda é um dos livros mais vendidos sobre arquitetura.[1]

**A Pattern Language**  
Towns · Buildings · Construction



Christopher Alexander  
Sara Ishikawa · Murray Silverstein  
WITH  
Max Jacobson · Ingrid Fiksdahl-King  
Shlomo Angel





- Desde 1995, o desenvolvimento de software passou a ter o seu primeiro catálogo de soluções para projeto de software: o livro GoF.
  - Catálogo GoF ("the gang of four")
    - "Design Patterns: Elements of Reusable Object-Oriented Software," Gamma, Helm, Johnson, Vlissides, Addison-Wesley, 1995
  - Passamos a ter um vocabulário comum para conversar sobre projetos de software.
    - Soluções que não tinham nome passam a ter nome.
    - Ao invés de discutirmos um sistema em termos de pilhas, filas, árvores e listas ligadas, passamos a falar de coisas de muito mais alto nível como Fábricas, Fachadas, Observador, Estratégia, etc.



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## Descrição de um Padrão de Projeto

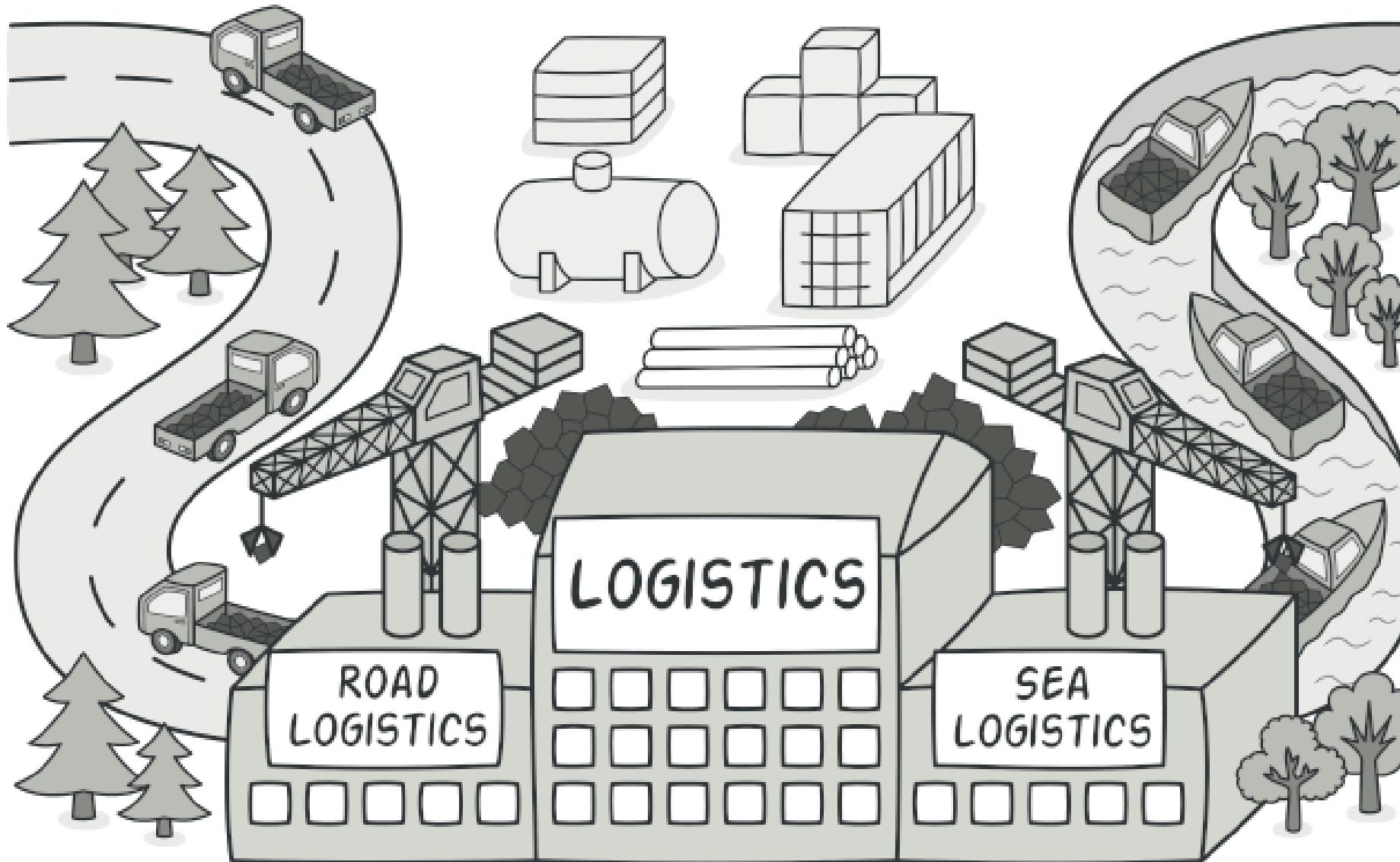
- Nome e Classificação
- Propósito
- Nome Secundário
- Motivação
- Aplicabilidade
- Estrutura
- Participantes
- Colaborações
- Conseqüências
- Implementação
- Exemplo
- Usos Conhecidos
- Padrões Relacionados

# Factory Method

Also known as: Virtual Constructor

## Intent

Factory Method is a creational design pattern that provides an interface for creating objects in a superclass, but allows subclasses to alter the type of objects that will be created.



Factory Method é um padrão de design criacional que fornece uma interface para criar objetos em uma superclasse, mas permite que subclasses alterem o tipo de objetos que serão criados.



## Problem



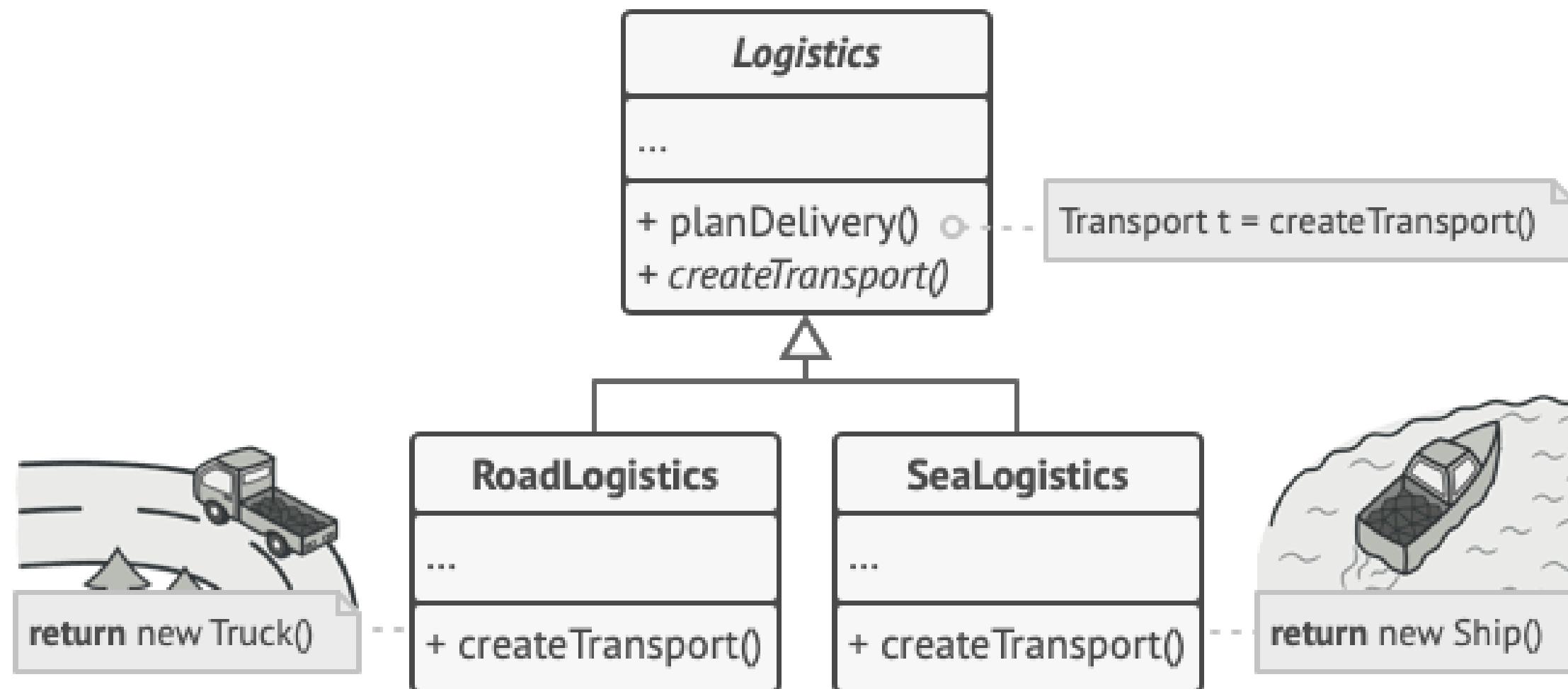
*Adding a new class to the program isn't that simple if the rest of the code is already coupled to existing classes.*

**Imagine que você está criando um aplicativo de gerenciamento de logística. A primeira versão do seu aplicativo só pode lidar com transporte por caminhões, então a maior parte do seu código fica dentro da classe Truck.**

**Depois de um tempo, seu aplicativo se torna bastante popular. Todos os dias você recebe dezenas de solicitações de empresas de transporte marítimo para incorporar a logística marítima ao aplicativo.**

# 😊 Solution

The Factory Method pattern suggests that you replace direct object construction calls (using the `new` operator) with calls to a special *factory* method. Don't worry: the objects are still created via the `new` operator, but it's being called from within the factory method. Objects returned by a factory method are often referred to as *products*.



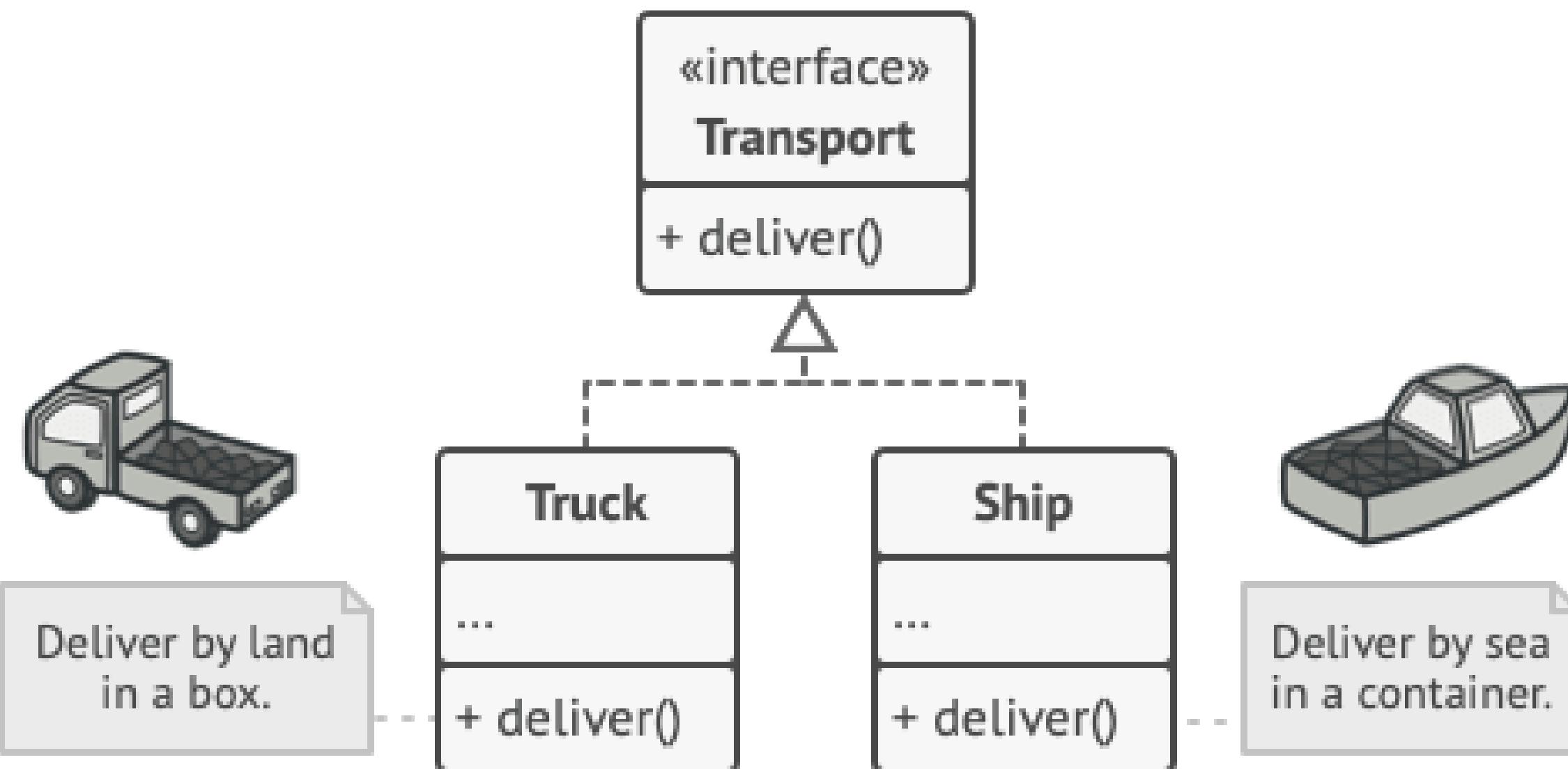
*Subclasses can alter the class of objects being returned by the factory method.*

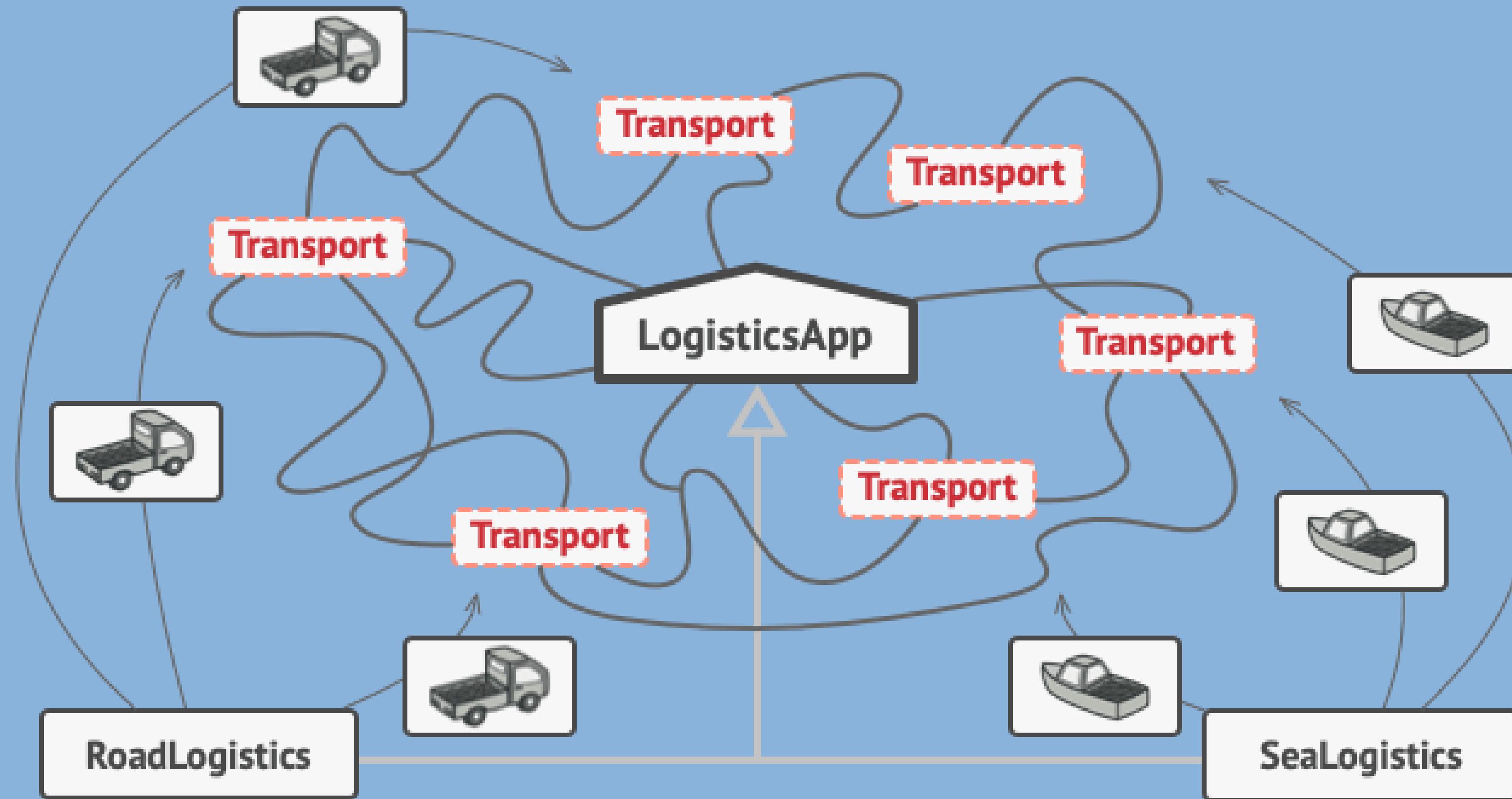


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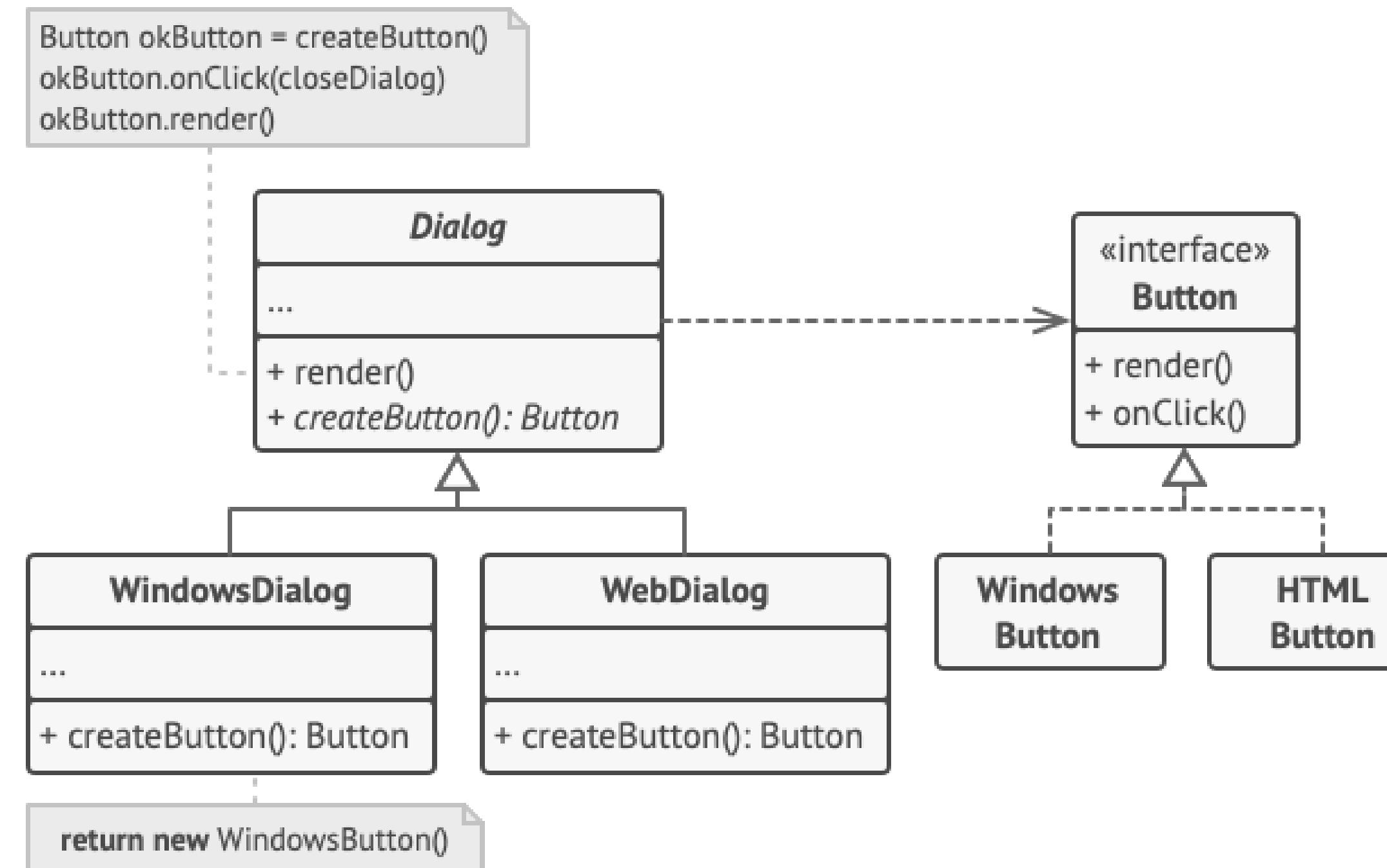
## Factory Method





# # Pseudocode

This example illustrates how the **Factory Method** can be used for creating cross-platform UI elements without coupling the client code to concrete UI classes.





## Vantages e Desvantagens do Factory Method

### Pros and Cons

- **Para evitar o acoplamento entre o criador e os produtos concretos.**
- **Princípio da Responsabilidade Única.** Você pode remover o código de criação do produto para um local no programa, facilitando o suporte ao código.
- **Princípio Aberto/Fechado.** Você pode introduzir novos tipos de produtos no programa sem quebrar o código do cliente existente

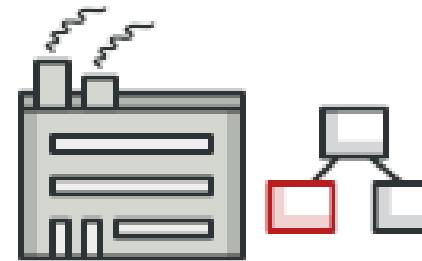
O código pode se tornar mais complicado, pois você precisa introduzir muitas novas subclasses para implementar o padrão. O melhor cenário é quando você está introduzindo o padrão em uma hierarquia existente de classes de criadores.



## Padrão de Projeto

[https://refactoring.guru/design-patterns/factory-method/python/example#:~:text=Factory%20method%20is%20a%20creational,constructor%20call%20\(%20new%20operator\).](https://refactoring.guru/design-patterns/factory-method/python/example#:~:text=Factory%20method%20is%20a%20creational,constructor%20call%20(%20new%20operator).)

/ Design Patterns / Factory Method / Python



# Factory Method in Python

**Factory method** is a creational design pattern which solves the problem of creating product objects without specifying their concrete classes.

The Factory Method defines a method, which should be used for creating objects instead of using a direct constructor call (`new` operator). Subclasses can override this method to change the class of objects that will be created.

Archive with examples

## Navigation

[Intro](#)

[Conceptual Example](#)

[main](#)

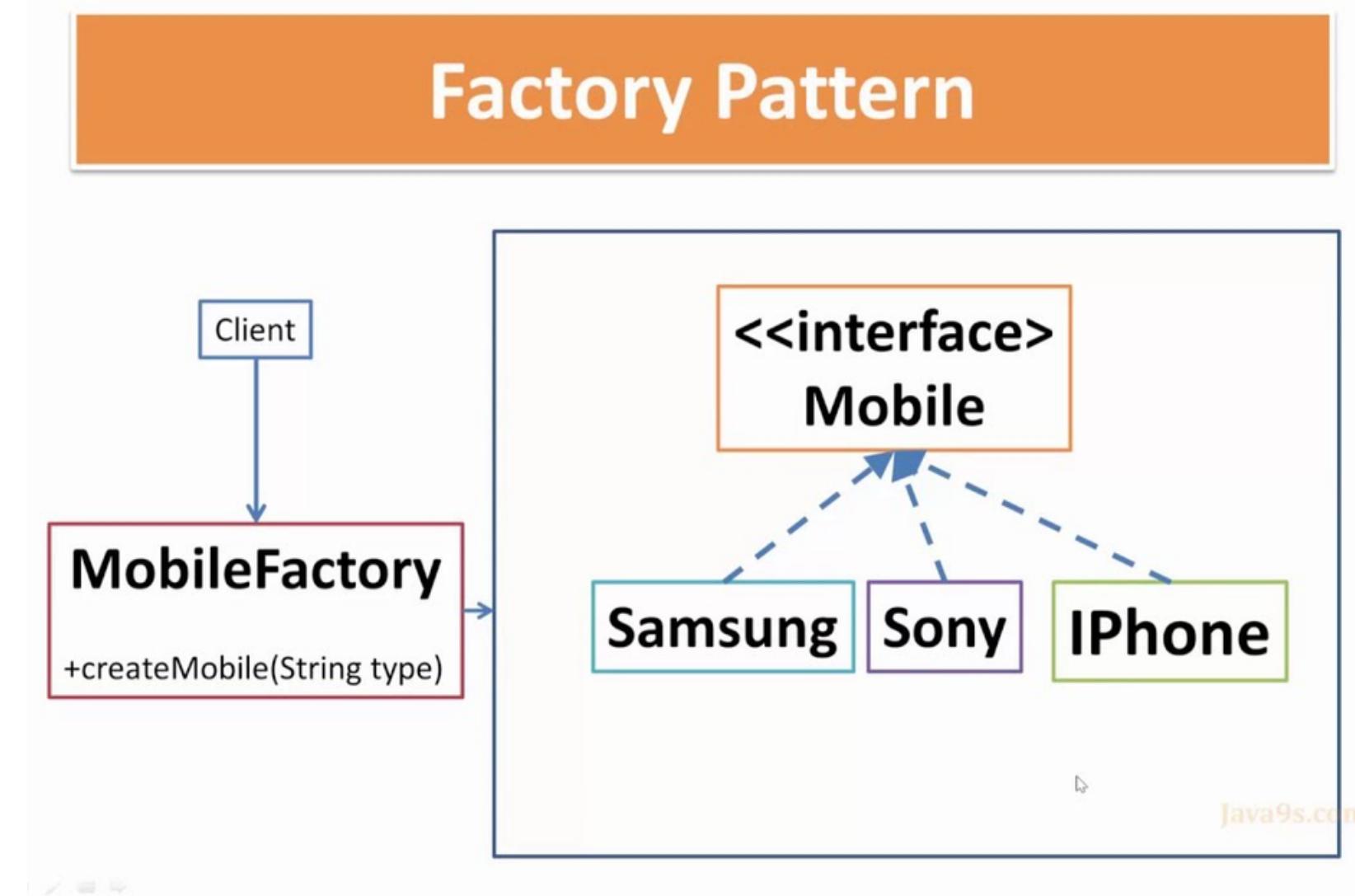
[Output](#)



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## Factory Method



<https://colab.research.google.com/drive/1UNS5AY0cr0PH1bIMEbIW7NNACOTbybxG?usp=sharing>



## Padrões de Projeto

- **Nome do padrão e classificação:**
  - Passa a fazer parte do vocabulário dos projetistas.
- **Propósito:**
  - Respostas para as perguntas - O quê o padrão faz? Que tipo de problema ou característica particular de Projeto ele trata?
- **Nomes secundário:**
  - Conjunto de outros nomes (apelidos) conhecidos para o padrão, se existir algum.
- **Motivação:**
  - Um cenário que ilustra o problema e como as estruturas de classes e objetos no padrão o resolvem.
- **Aplicação:**
  - Respostas para as perguntas - Quais são as situações onde este padrão pode ser aplicado? Quais são os exemplos de projetos que ele pode tratar? Como você pode reconhecer estas situações?



## Padrões de Projeto

### Estrutura:

- Uma representação gráfica das classes

### Participantes:

- As classes e/ou objetos que participam no Padrão de Projeto suas responsabilidades.

### Colaborações:

- Como os participantes interagem para cumprir suas responsabilidades.

### Conseqüências:

- Resultados e efeitos causados pela aplicação do Padrão
- Respostas para as perguntas - Como o Padrão alcança seus objetivos? Quais são os resultados do uso do Padrão?



## Padrões de Projeto

- **Implementação:**
  - Dicas e técnicas que o projetista deve saber, e possíveis armadilhas para as quais ele deve estar preparado.
- **Código Exemplo:**
  - Fragmentos de código que ilustrem como o Padrão deve ser implementado
- **Usos Conhecidos:**
  - Exemplos de utilização do Padrão em sistemas já implementados.
- **Padrões Relacionados:**
  - Lista de todos os Padrão fortemente relacionados ao Padrão em questão e as suas principais diferenças.

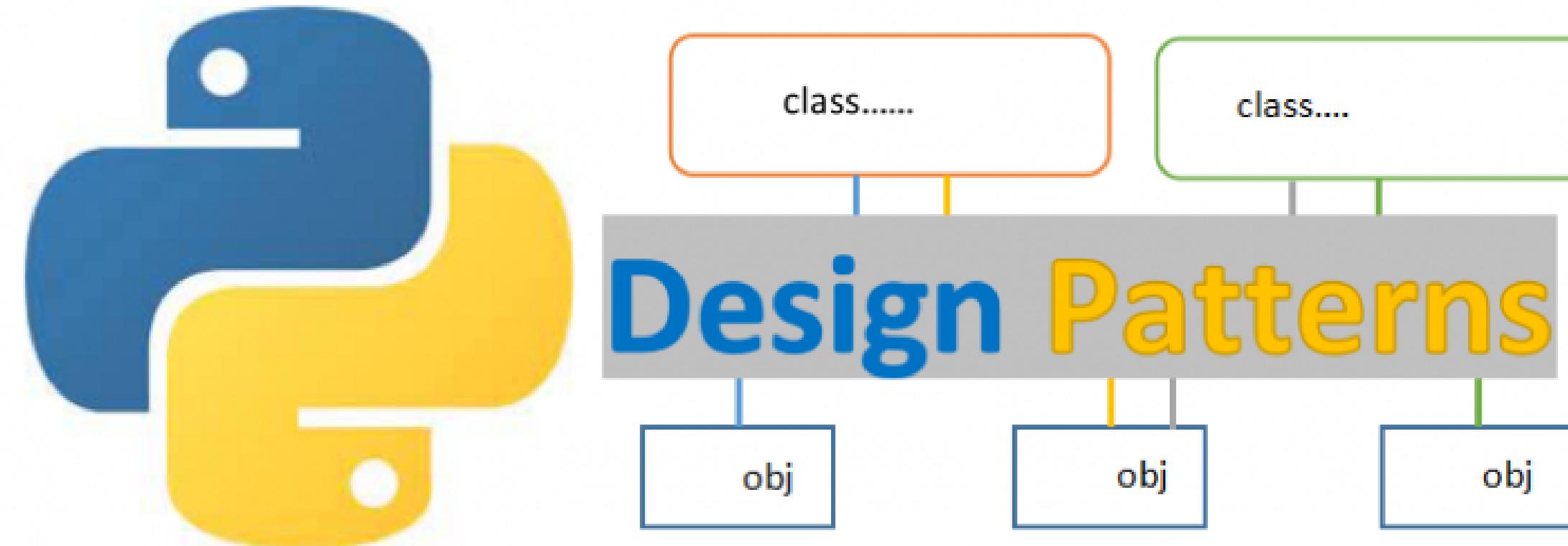


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## Design Patterns in Python

[https://colab.research.google.com/drive/1CaNV\\_WZUv-YQDGB0IKjsuP3MUdGuwgOy?usp=sharing](https://colab.research.google.com/drive/1CaNV_WZUv-YQDGB0IKjsuP3MUdGuwgOy?usp=sharing)





- Podem ser classificados quanto ao:
  - Quanto ao seu escopo:
    - Classes: padrões tratam do relacionamento entre classes e subclasses;
    - Objetos: padrões tratam relacionamentos entre objetos
  - Quanto ao seu propósito:
    - Padrões Criacionais (Creational)
    - Padrões Estruturais (Structural)
    - Padrões Comportamentais (Behavioral)



## Padrões de Projeto

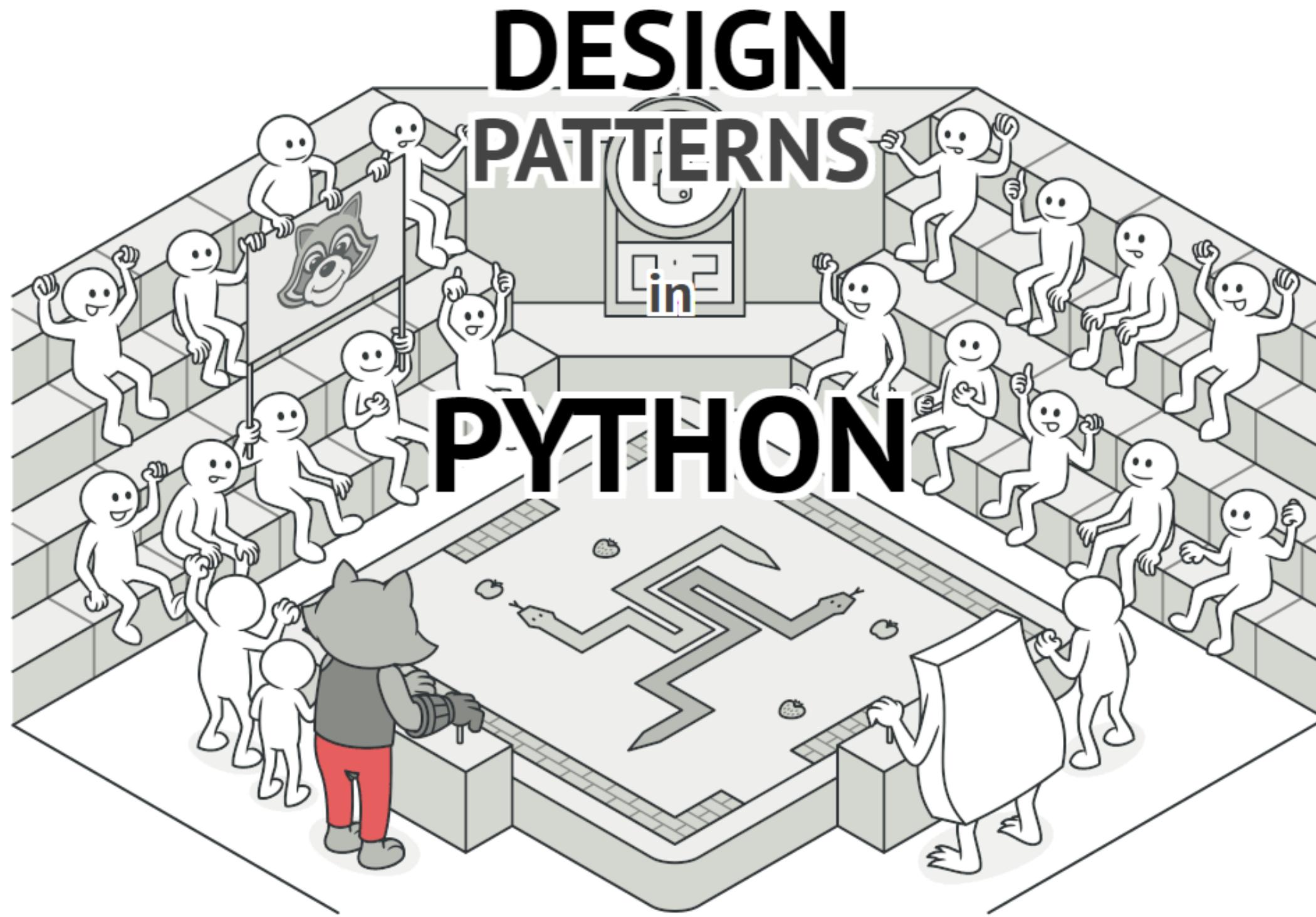
- **Padrões Criacionais**
  - Todos os Padrões Criacionais tratam da melhor maneira como instanciar objetos;
    - “Classe Criadora” especial pode tornar o programa mais flexível e geral.
- **Padrões Estruturais**
  - Descrevem como classes e objetos podem ser combinados para formar grandes estruturas;
    - Objetos padrões descrevem como objetos podem ser compostos em grandes estruturas utilizando composição ou inclusão de objetos com outros objetos.
- **Padrões Comportamentais**
  - Descreve padrões de comunicação entre objetos ou classes
    - Caracteriza o modo como classes e objetos interagem e compartilham responsabilidades.



## Padrões de Projeto

		Propósito		
		Criacionais	Estruturais	Comportamentais
Escopo	Classe	Factory Method	Adapter (classe)	Interpreter
				Template Method
	Objeto	Abstract Factory	Adapter (object)	Chain of Responsibility
		Builder	Bridge	Command
		Prototype	Composite	Iterator
		Singleton	Decorator	Mediator
			Façade	Memento
			Flyweight	Observer
			Proxy	State
				Strategy
				Visitor

- Veja suas implementações em java em <http://www.fluffycat.com/java-design-patterns/>



The Catalog of Python Examples

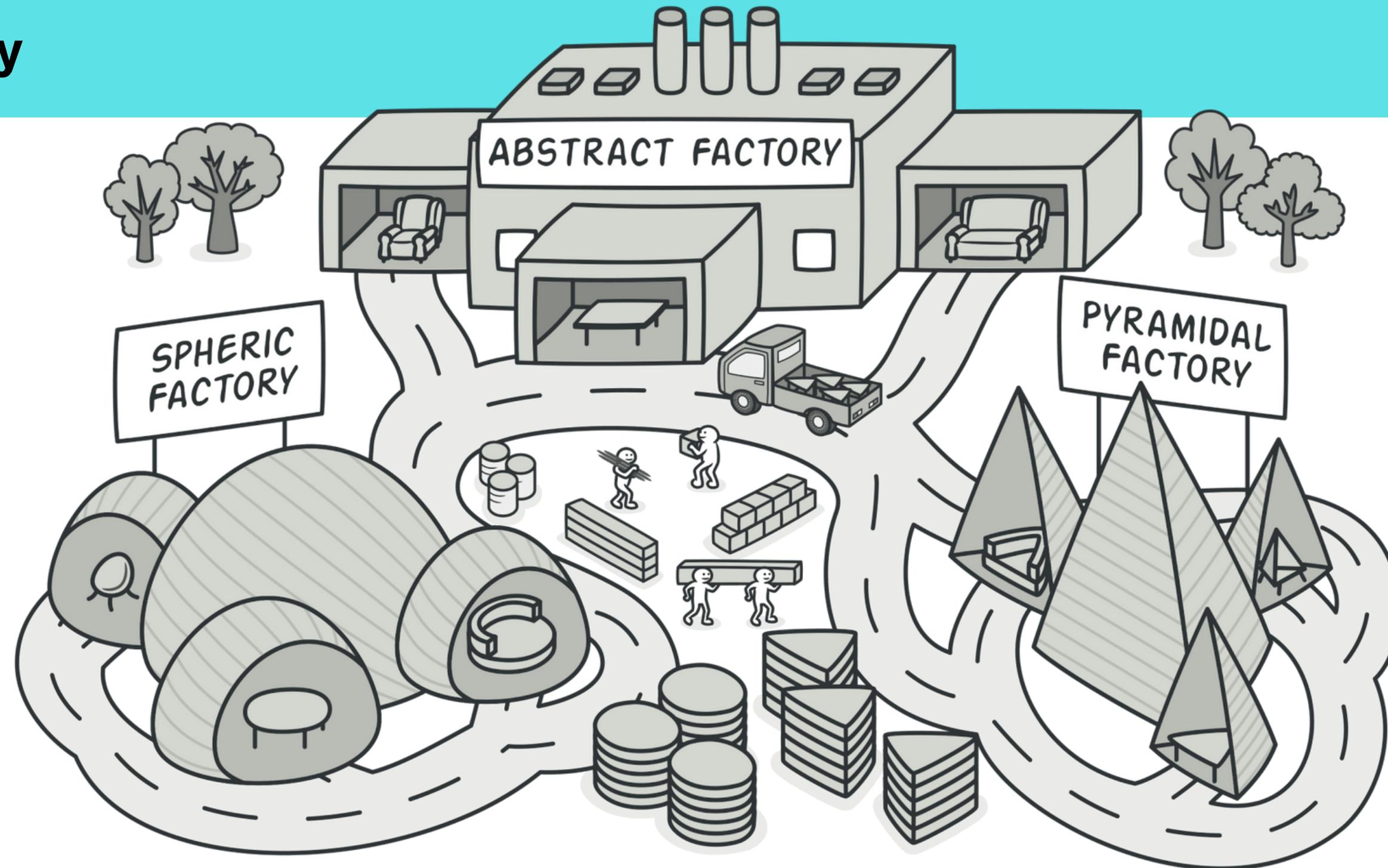
***<https://refactoring.guru/design-patterns/python>***



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## Abstract Factory



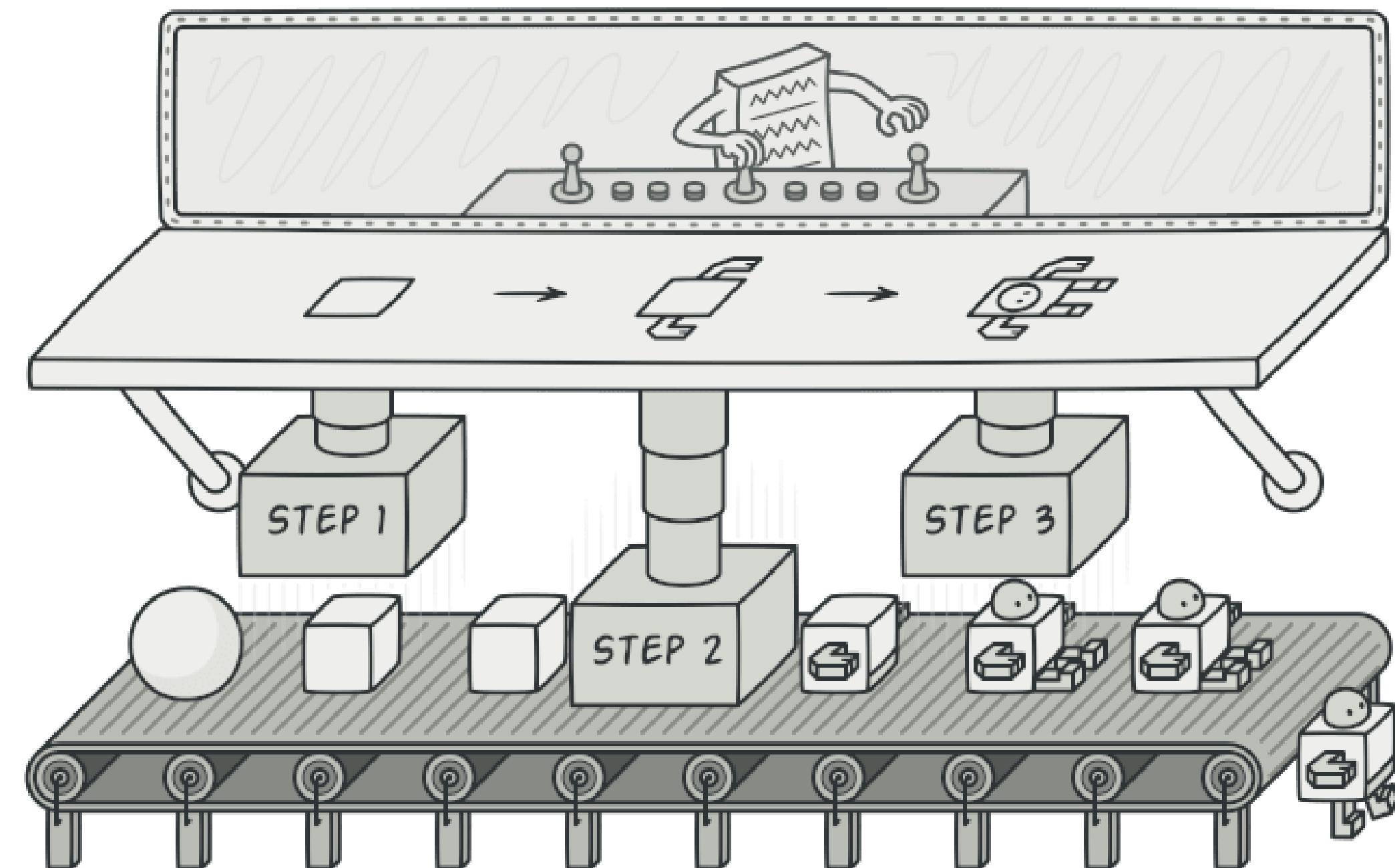
[https://colab.research.google.com/drive/1qQ4GW\\_GhcdHfy7ASTva7HfYObANCZijd?usp=sharing](https://colab.research.google.com/drive/1qQ4GW_GhcdHfy7ASTva7HfYObANCZijd?usp=sharing)



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## Builder Pattern



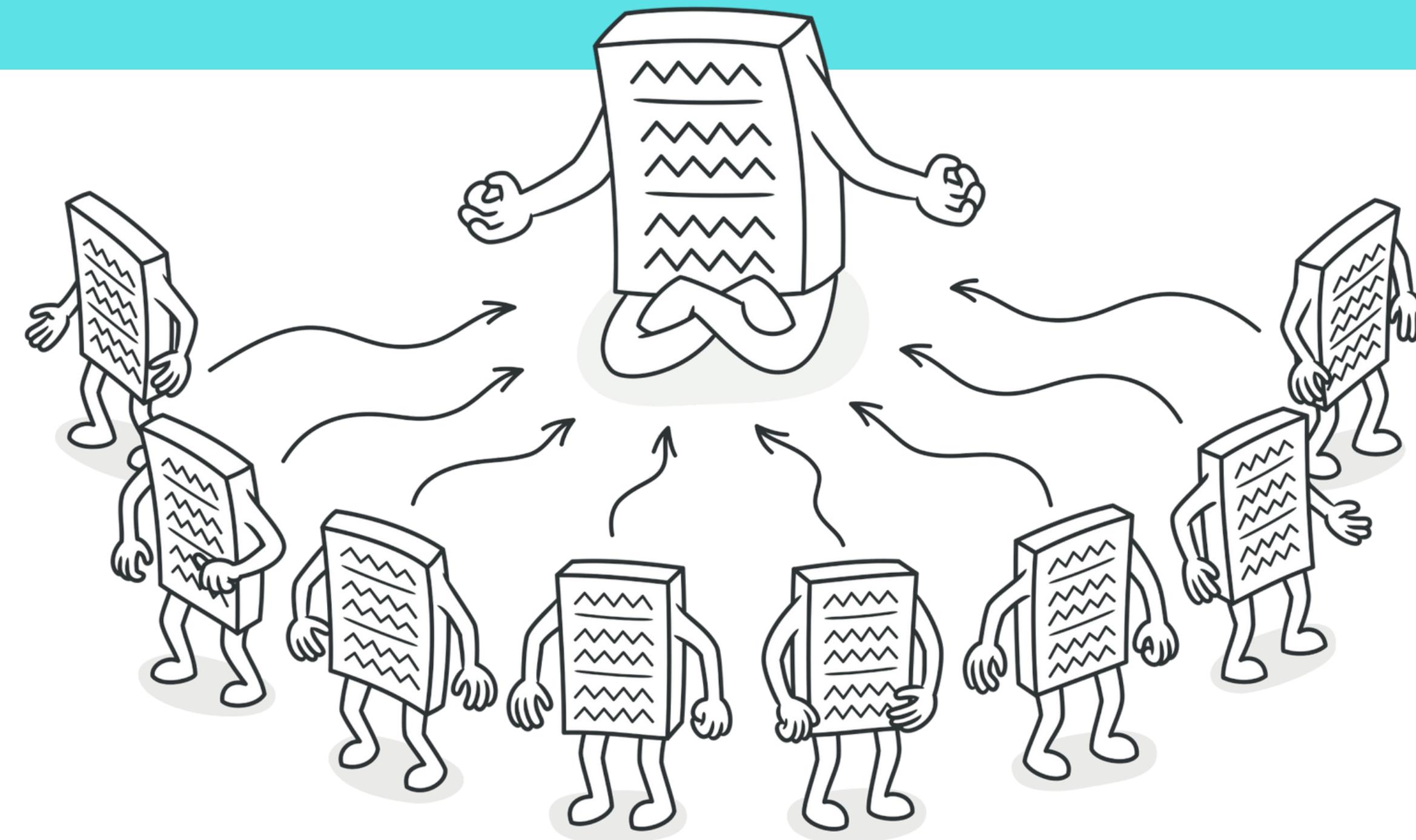
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## Singleton

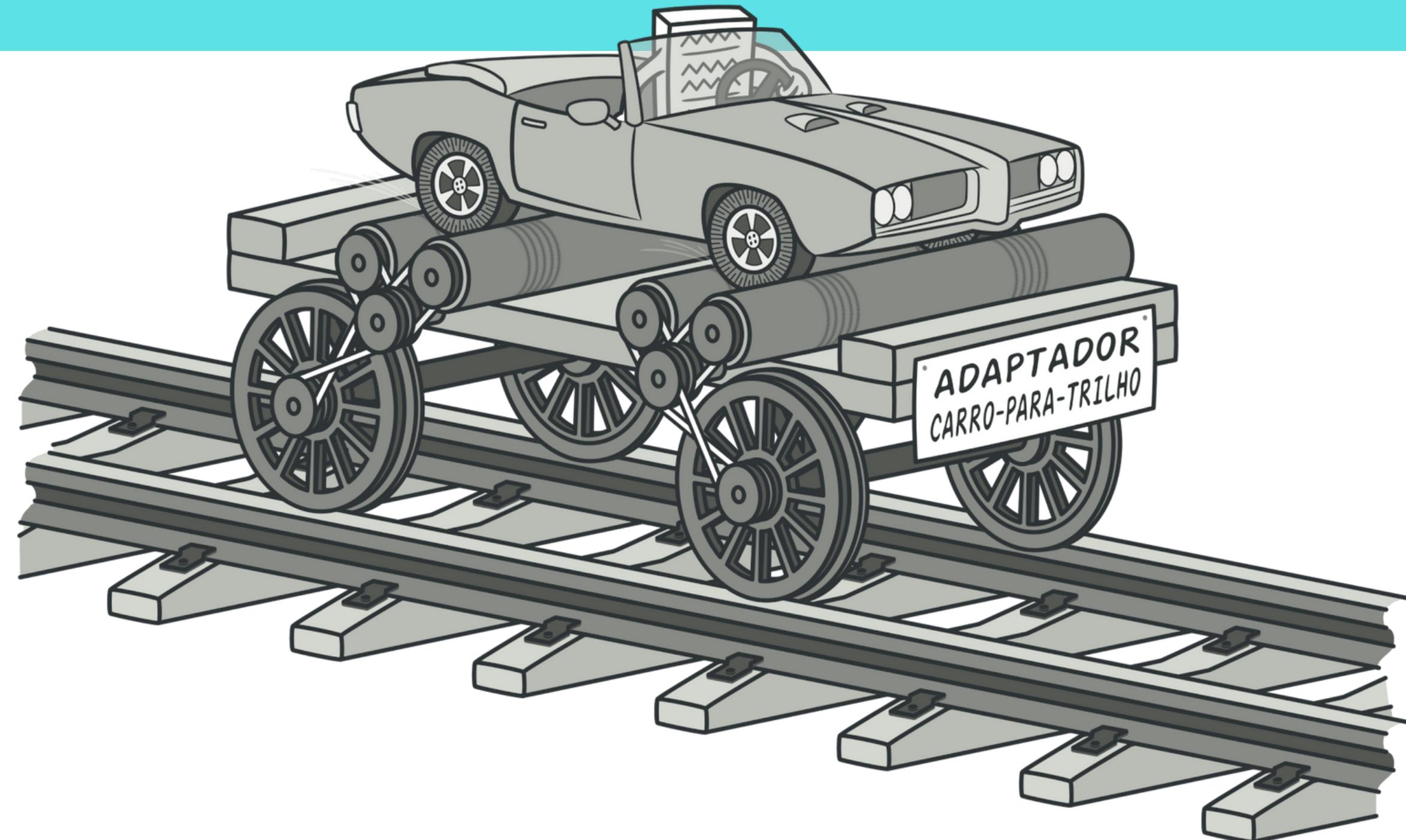




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## Adapter

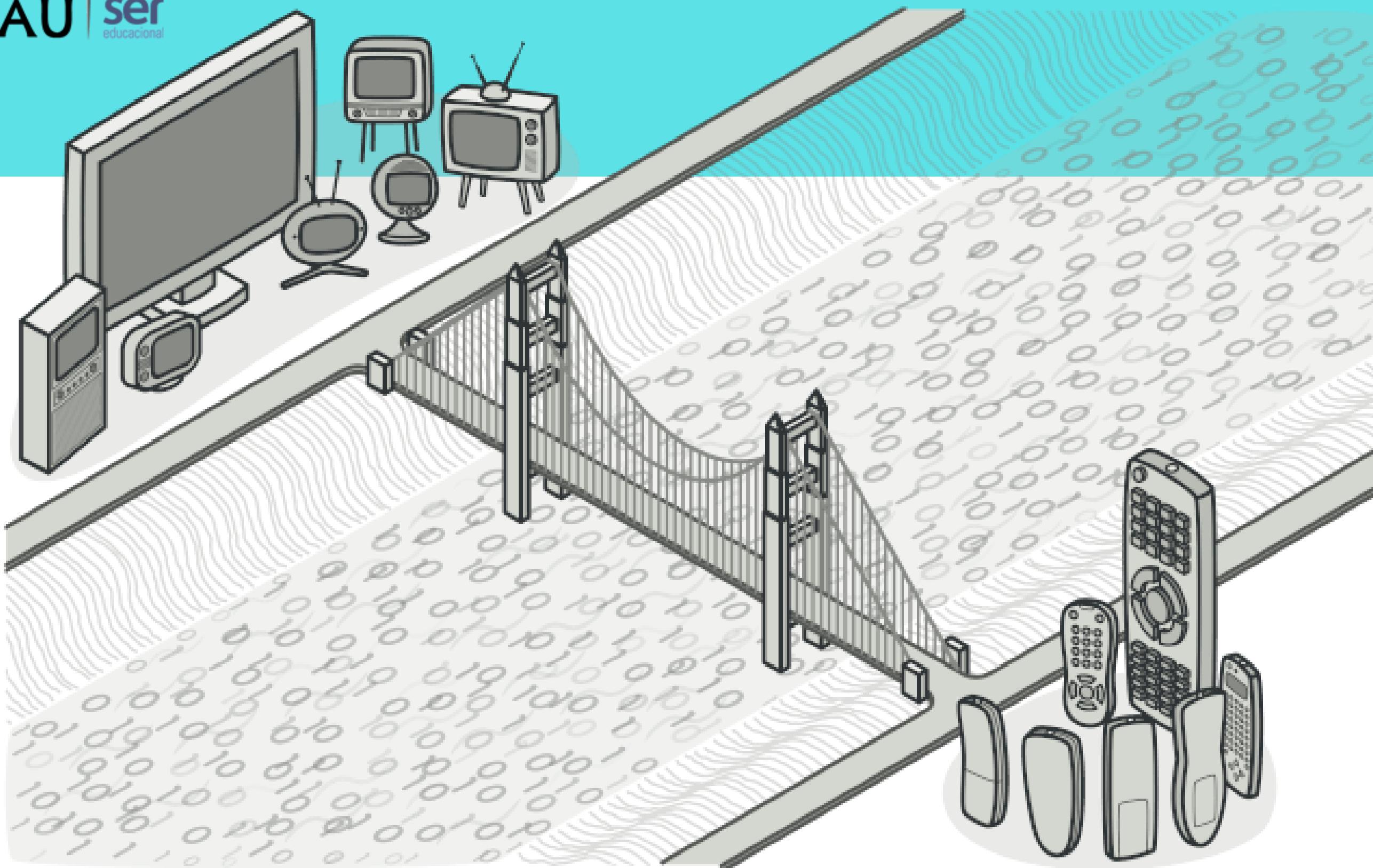




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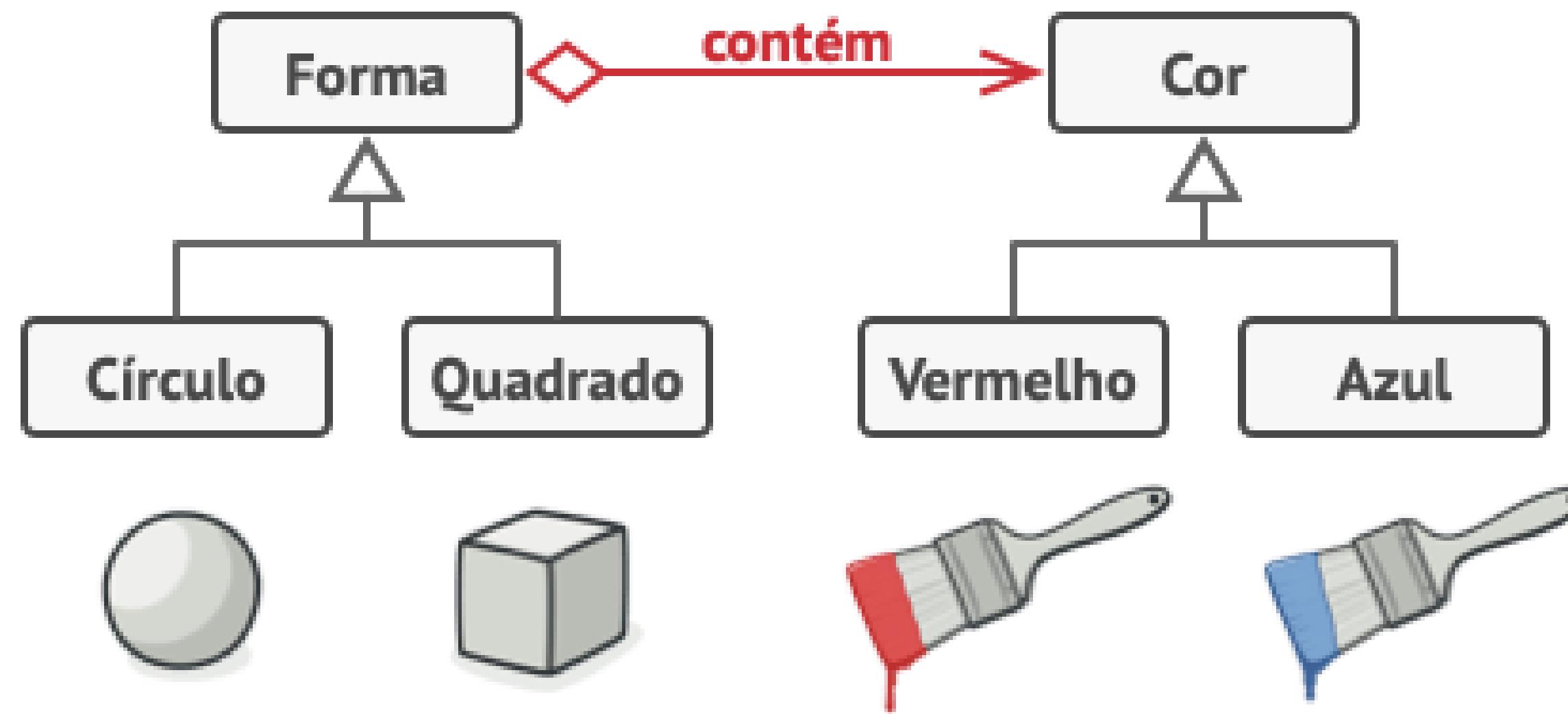
## Bridge



[https://colab.research.google.com/drive/1sC\\_DNsF9EWZQTRwQS5iTn7f0gJfkyUbG?usp=sharing](https://colab.research.google.com/drive/1sC_DNsF9EWZQTRwQS5iTn7f0gJfkyUbG?usp=sharing)

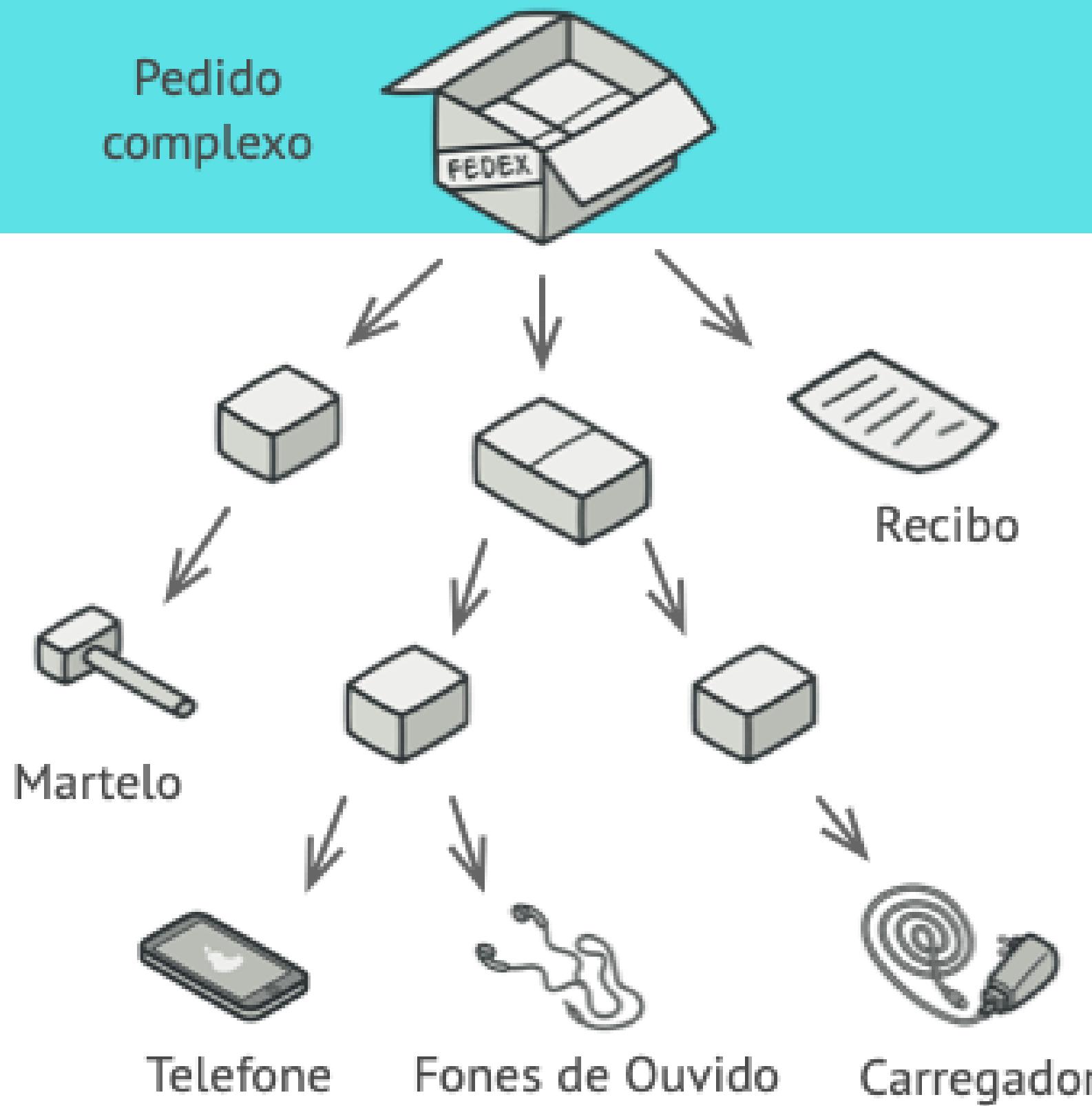


## Bridge





## Composite

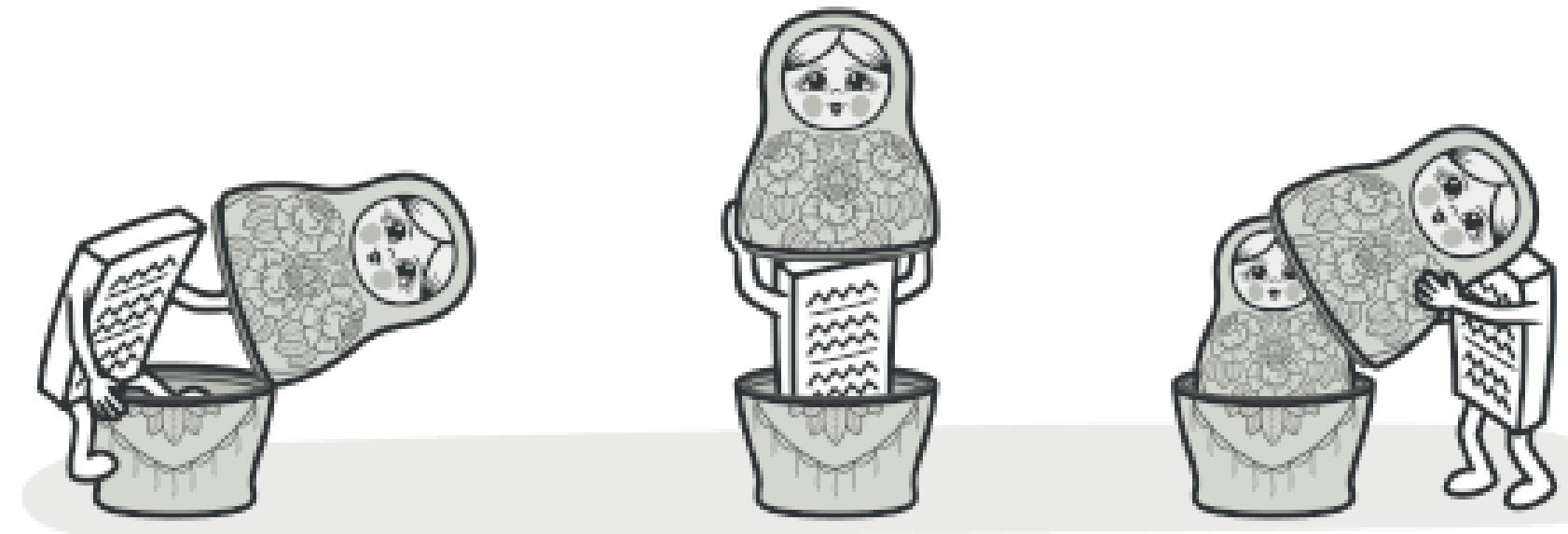




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## Composite

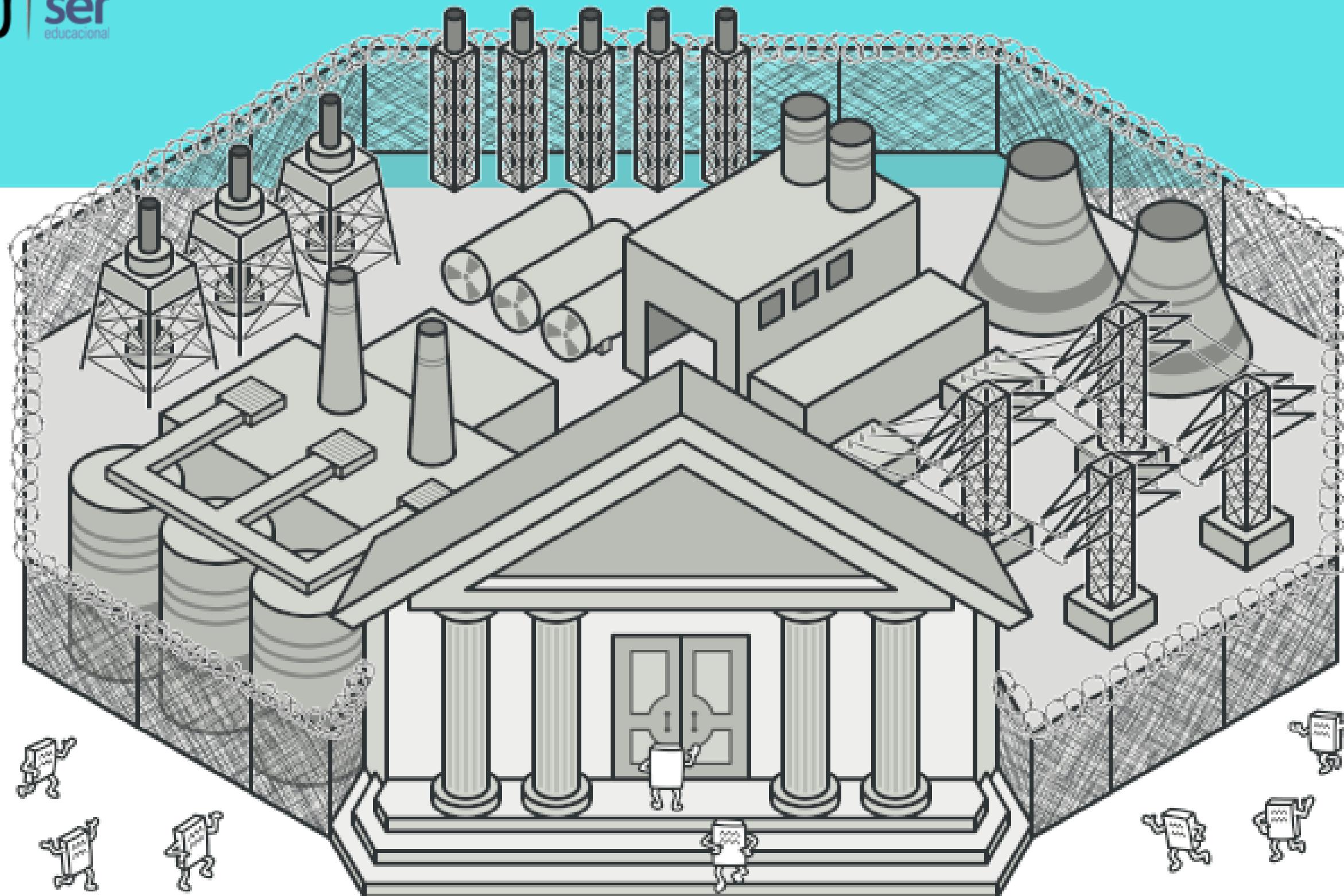




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## Facade

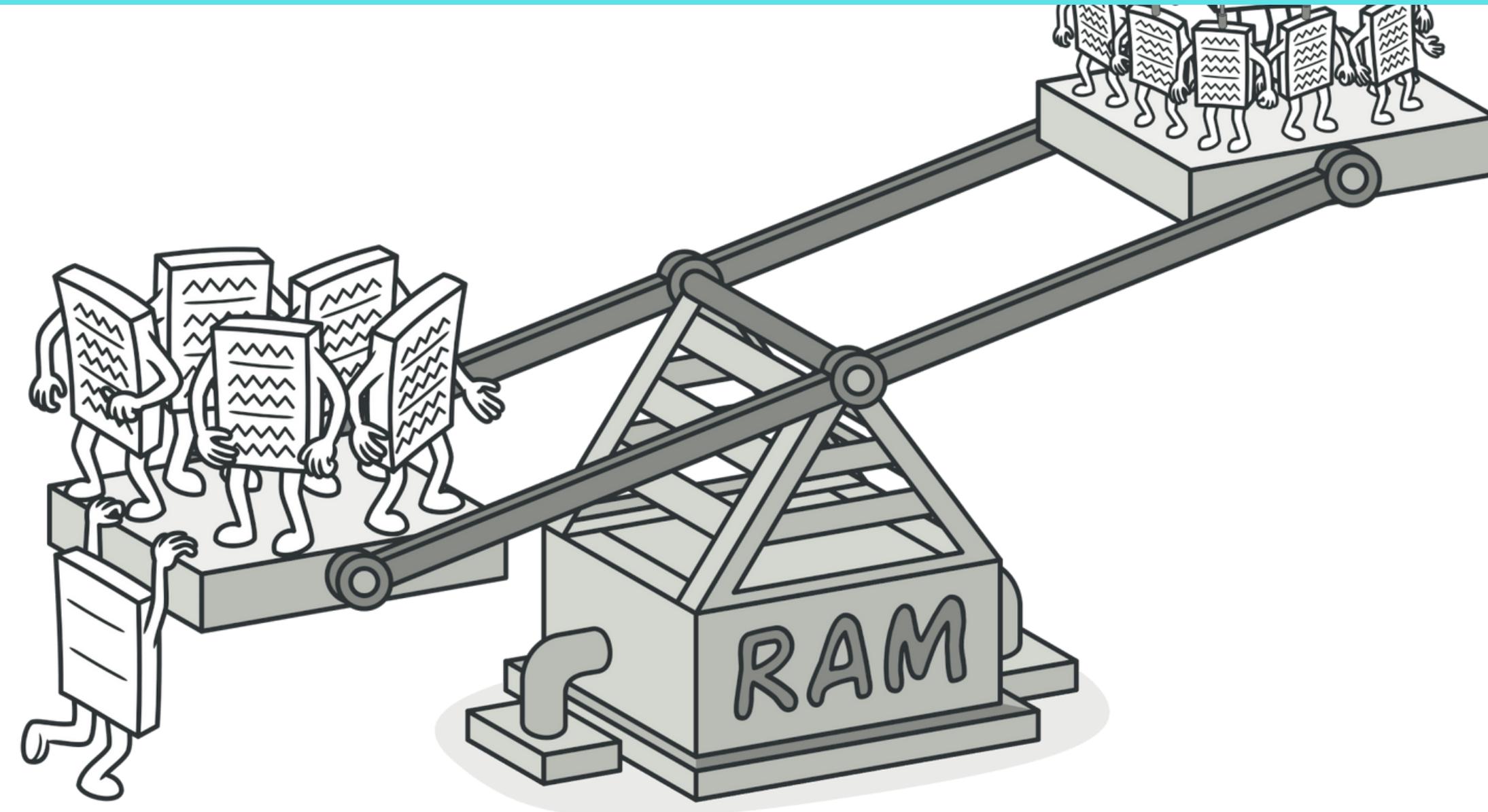




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## Flyweight in Python

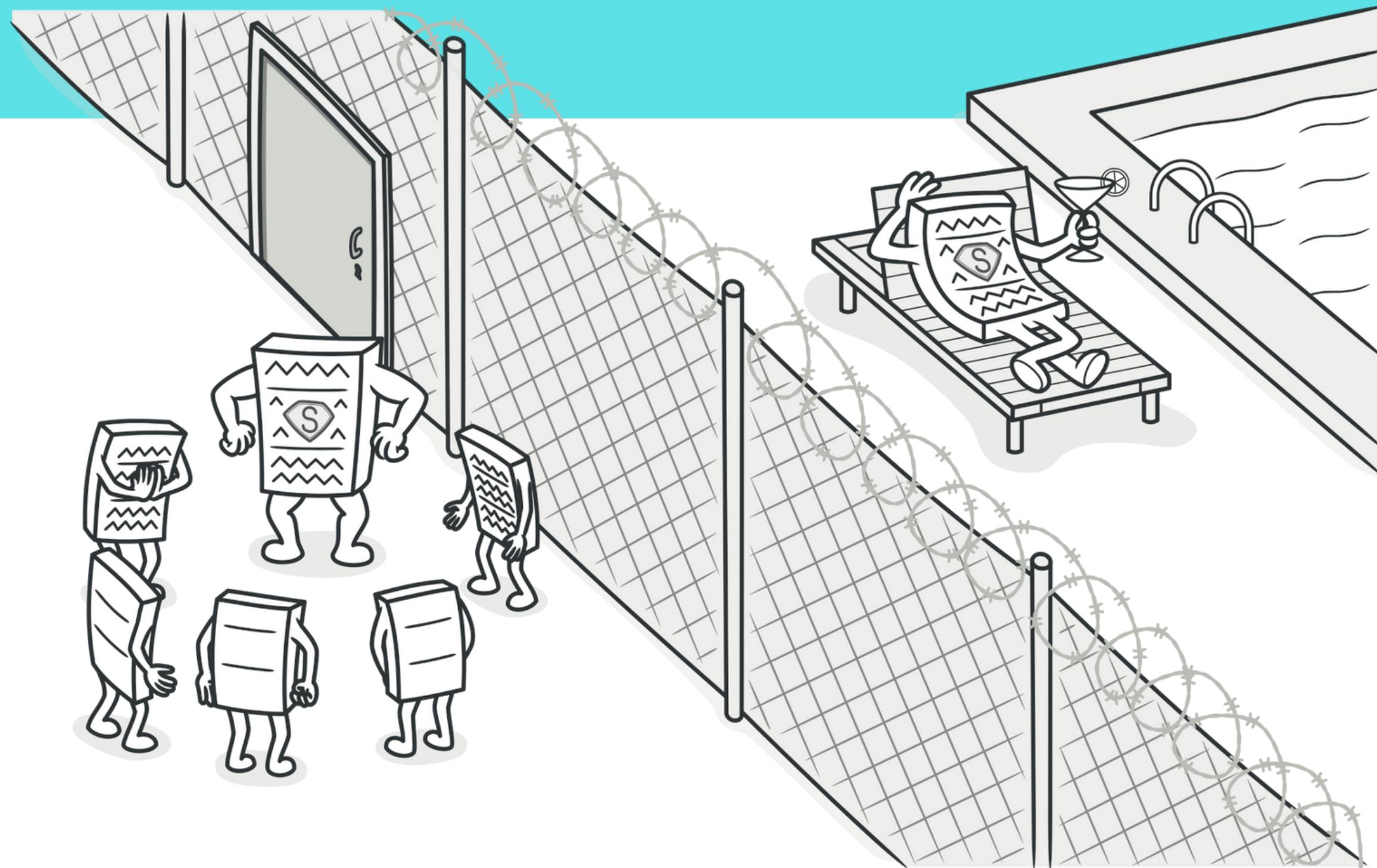




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## Proxy

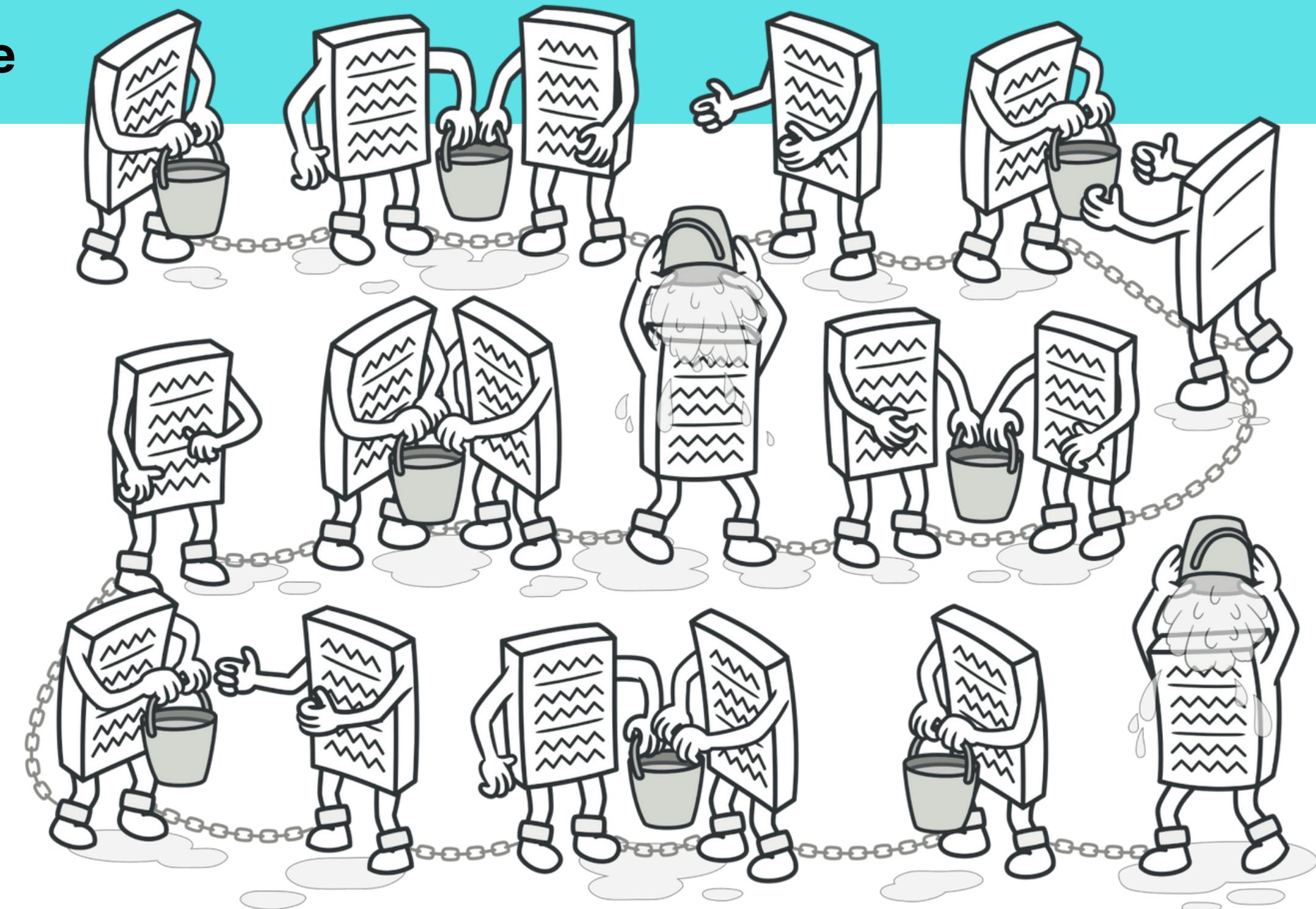




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## Cadeia de Responsabilidade





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## Command

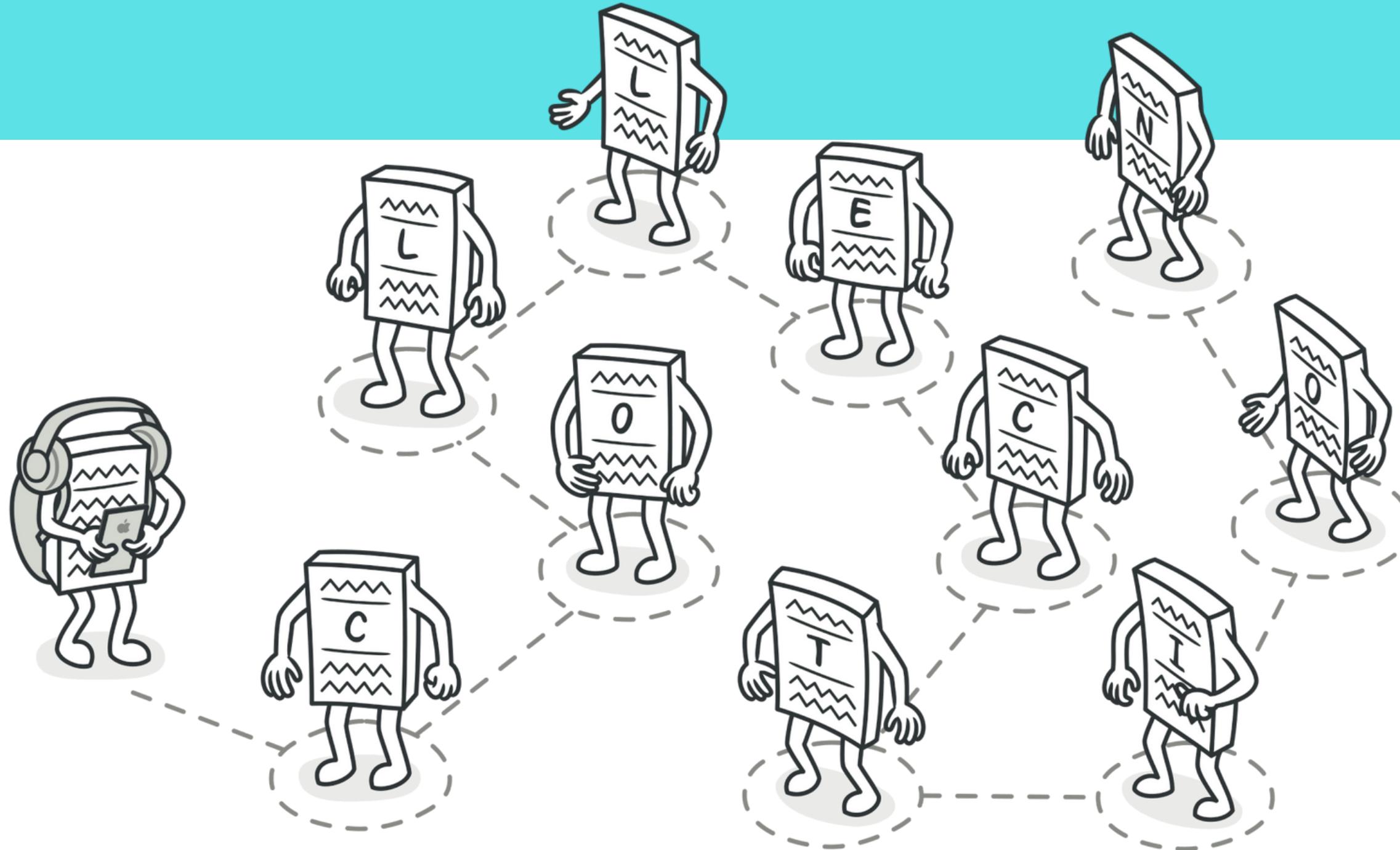




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## Iterator

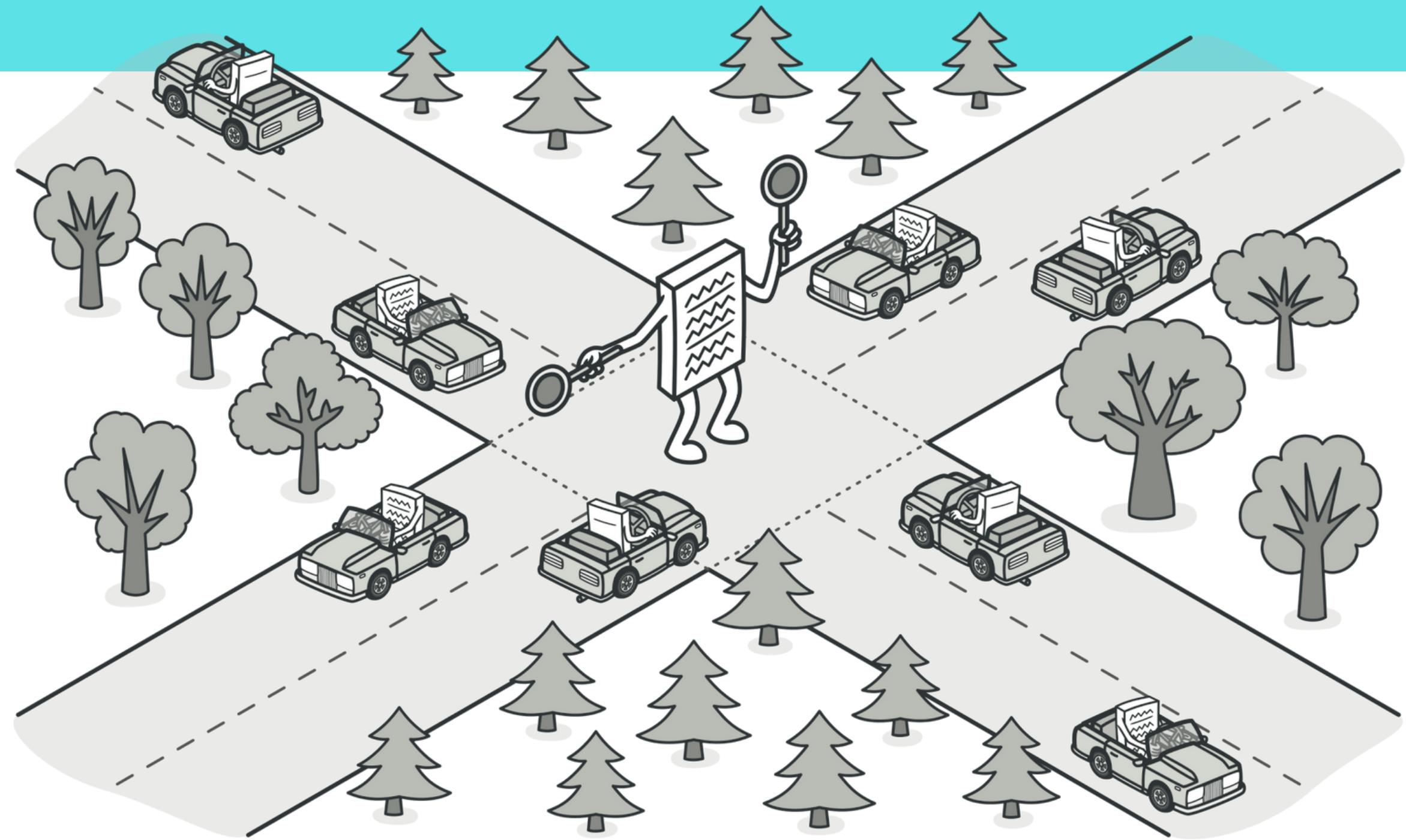




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## Iterator





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## Memento

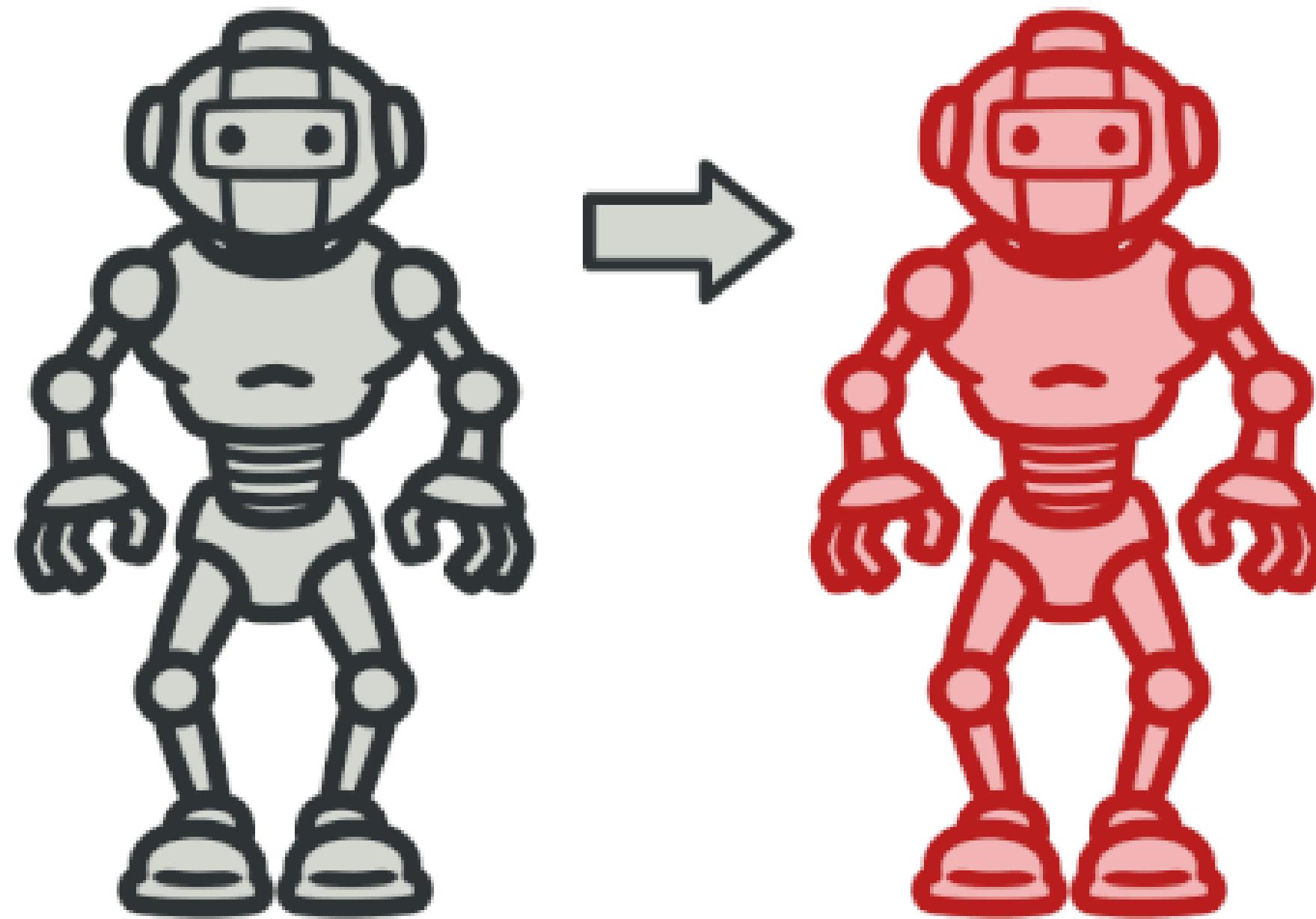




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## Prototype



[https://colab.research.google.com/drive/1IXyn9brJ4Krt5pcHHugZnHdPhZ5fU\\_qv?usp=sharing](https://colab.research.google.com/drive/1IXyn9brJ4Krt5pcHHugZnHdPhZ5fU_qv?usp=sharing)



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## Devops



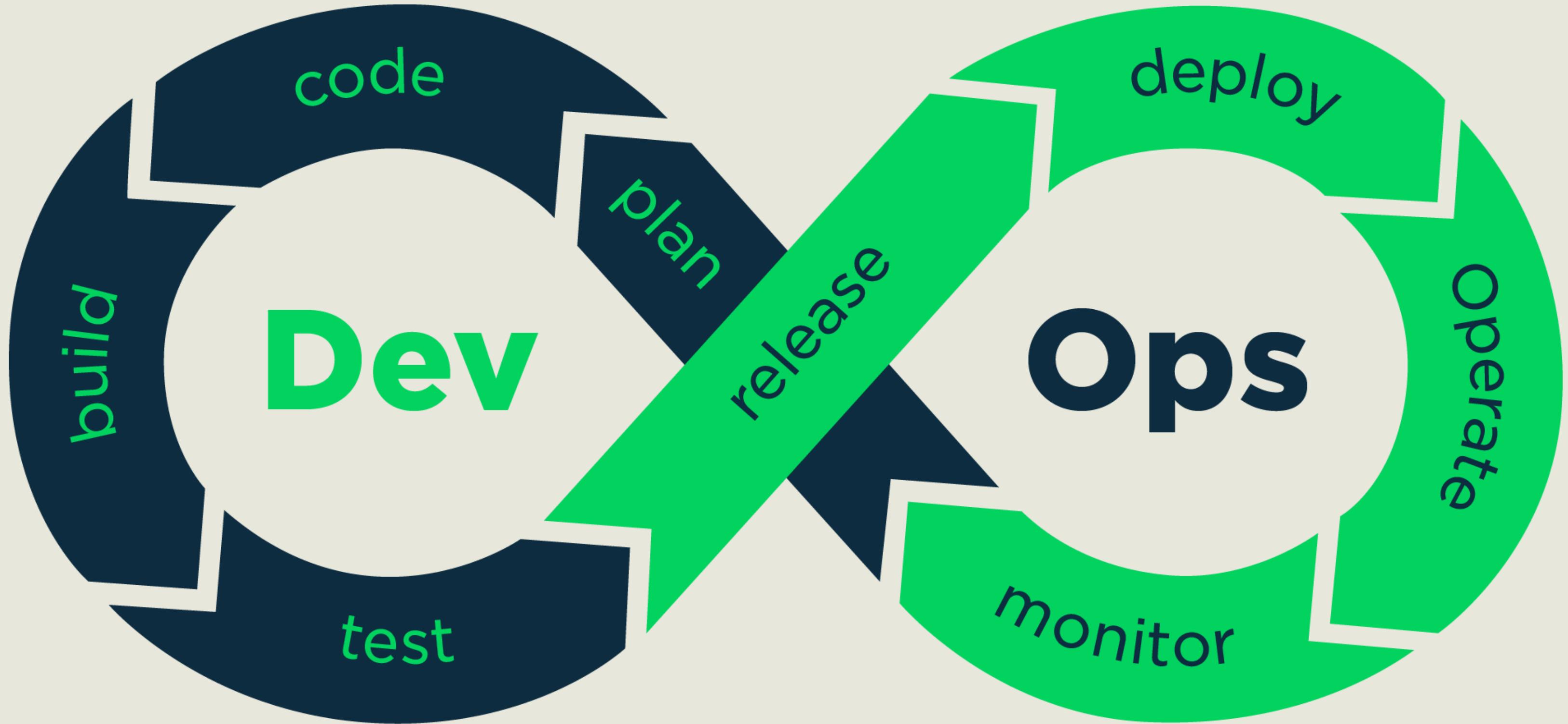


Who is Dev? Who is Ops?

What is DevOps?

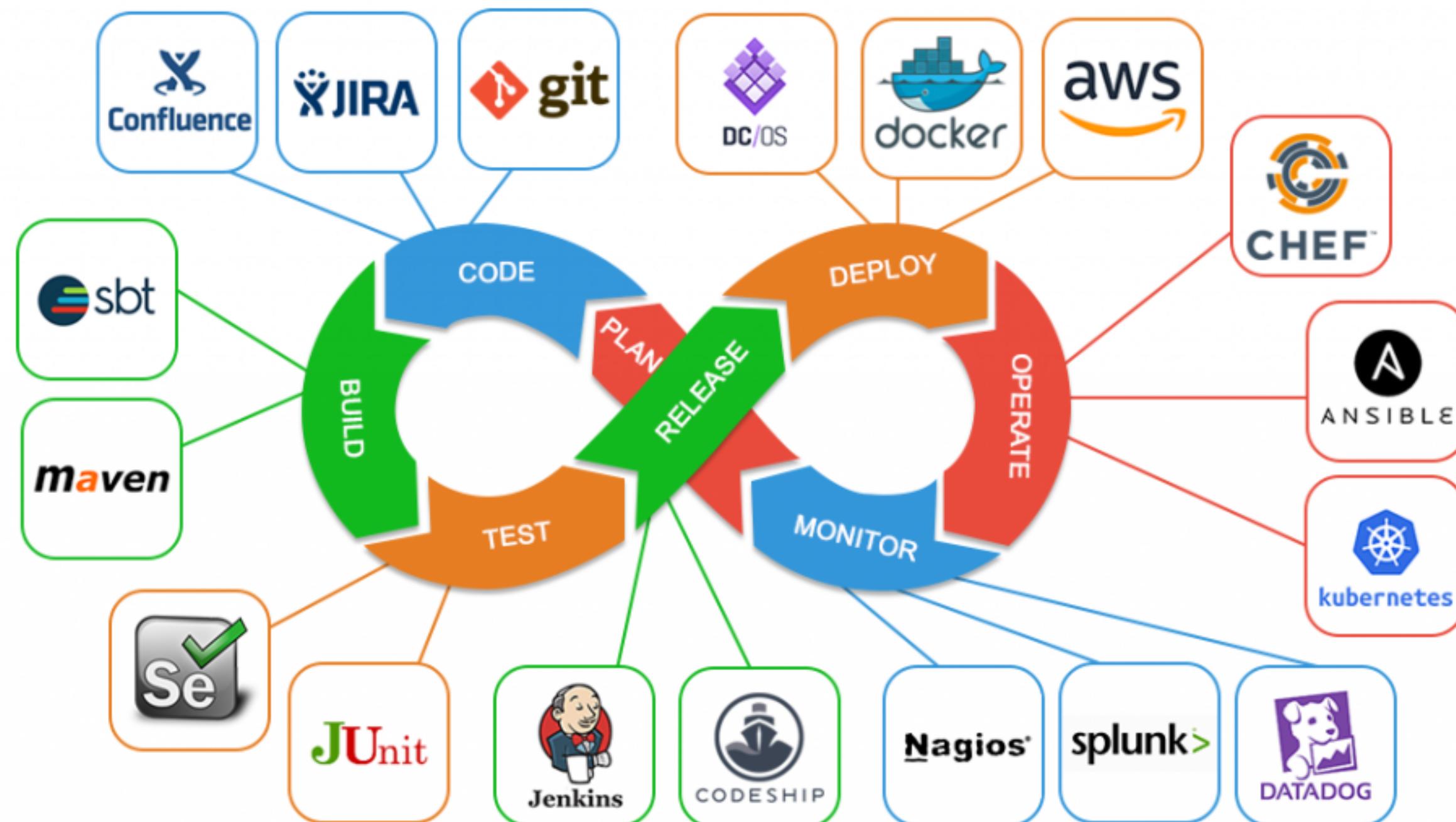
“The beginning of wisdom  
is the definition of terms”  
- Socrates

DevOps, é uma prática da engenharia de software e TI que unifica o desenvolvimento de software(Dev) e as operações de TI(Ops), tendo característica de defender a automação e monitoramento de todas as fases da construção de um software (desde a integração, teste, liberação para implantação, ao gerenciamento de infraestrutura).





# DEVOPS

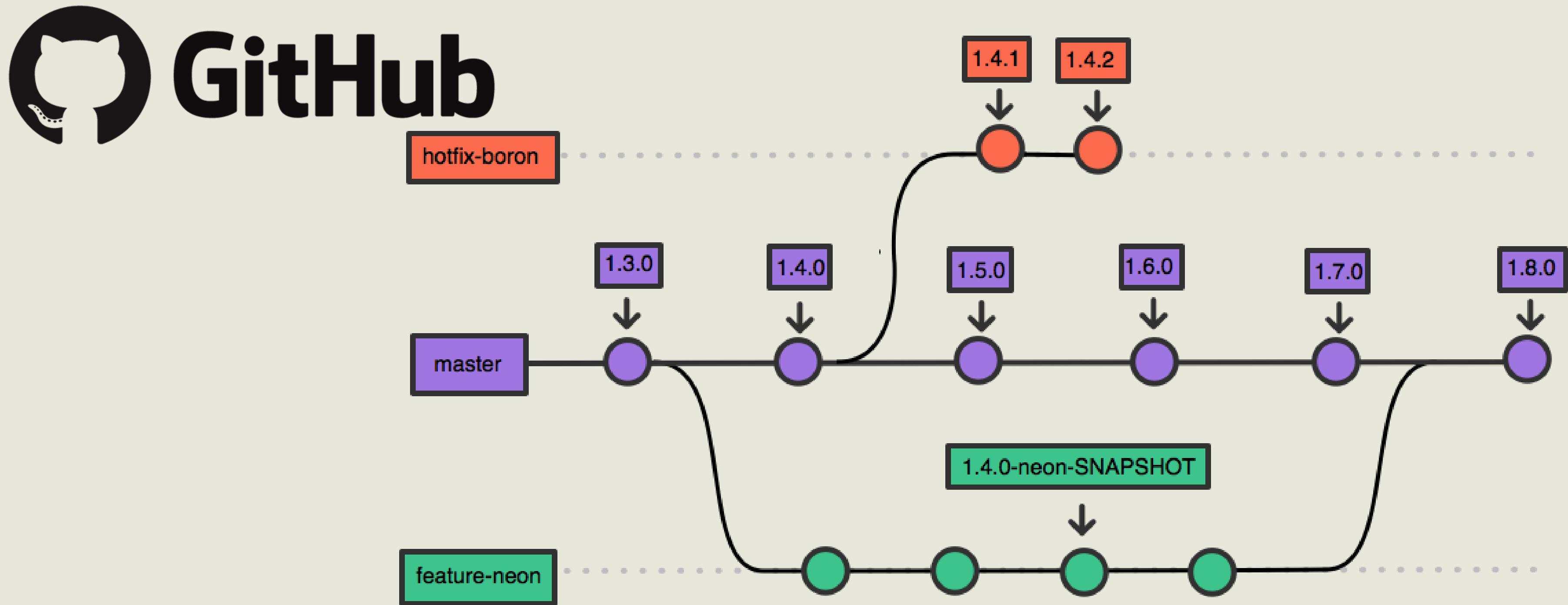




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## GITHUB

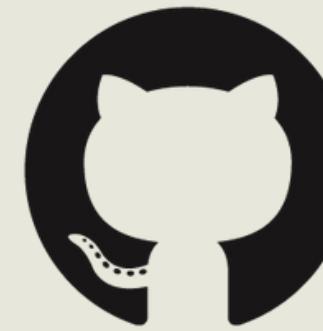




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GITHUB



GitHub

VAMOS  
APRENDER!

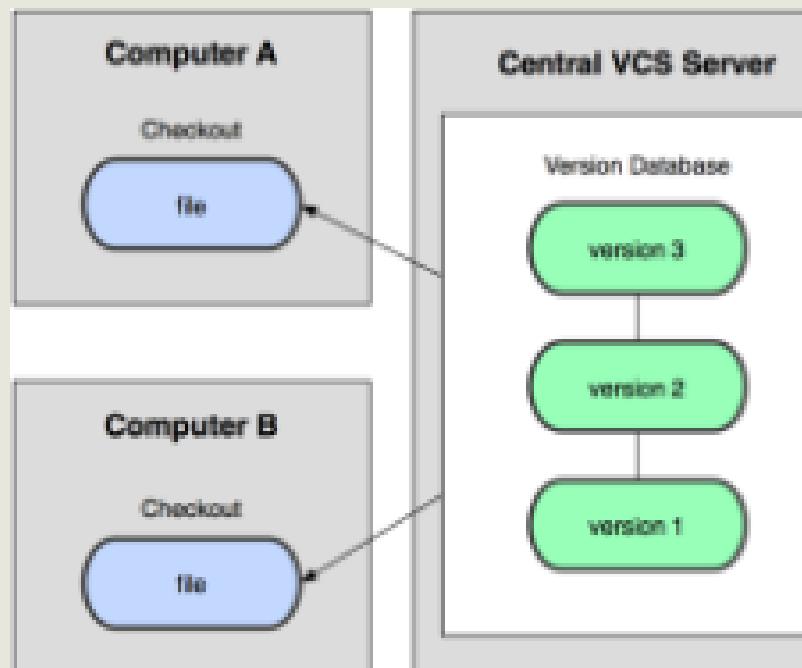
[https://learngitbranching.js.org/?locale=pt\\_BR](https://learngitbranching.js.org/?locale=pt_BR)



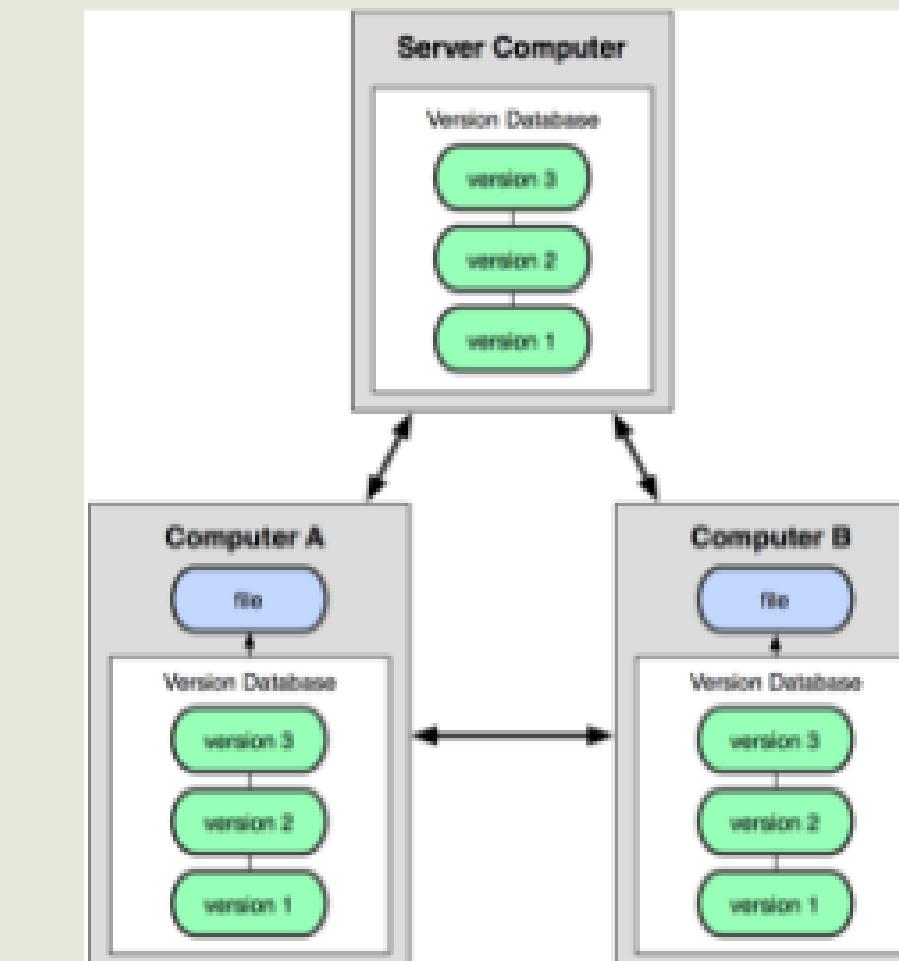
GITHUB

# Git uses a distributed model

Centralized Model



Distributed Model



(CVS, Subversion, Perforce)

(Git, Mercurial)

Result: Many operations are local



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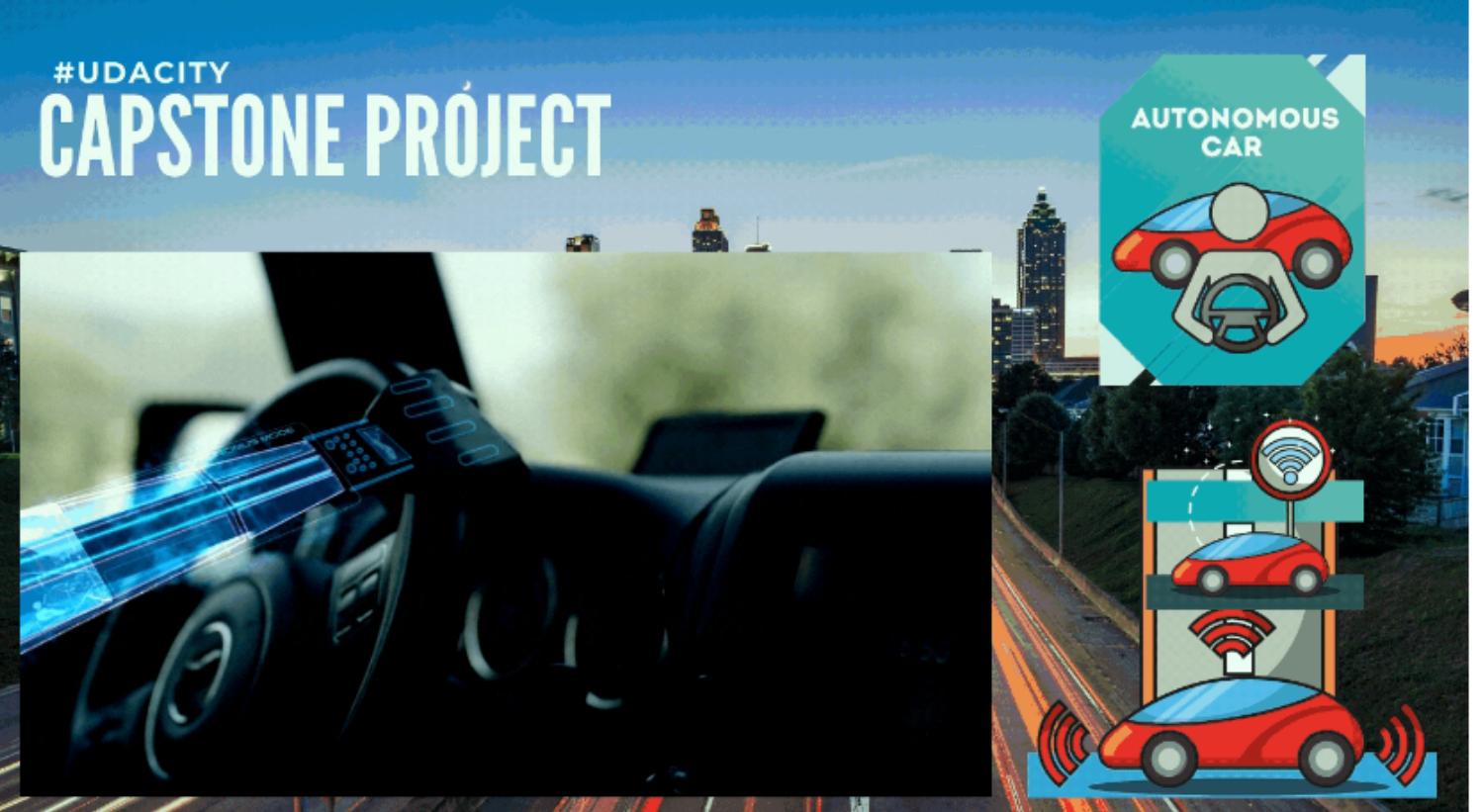


# Apresente seu projeto no Github usando o README

README.md

## Self-Driving Car Engineer Capstone Project

Member: Francisco Nauber Bernardo Gois

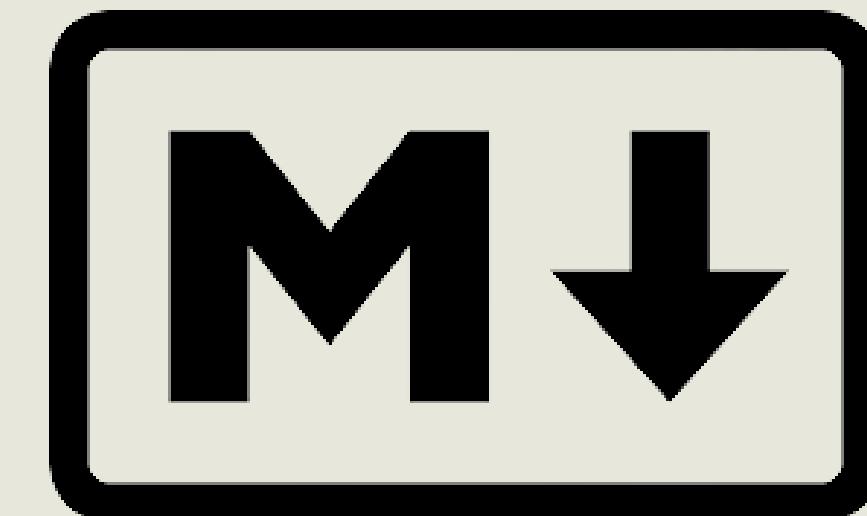


#UDACITY CAPSTONE PROJECT

Link of video: <https://www.youtube.com/watch?v=J63XneztDAA>

For the past couple of decades, we've noticed a steady growth in research from driverless technology. Indeed, a fleet of dependable autonomous vehicles can reevaluate freedom and road safety while radically reducing driving costs. Because of this, it's one of the very talked-about technologies in both the business and academia today. The recent improvements in sensor technology and increased computing capacities have fueled those improvements, together with all the perceived transport and societal advantages: In 2018, there have been 33,654 deaths, with 1.9 million accidents from the United States NHTSA Vatsa, (S. (2020). Digital Commons @ Michigan Tech VEHICLE DYNAMICS

<https://github.com/naubergois/selfdrivingcarscapstone>



```
readme.md x
1 # Markdown
2
3 You can emphasize text with **bold**, *italic*, or ***both***.
4
5 ## Subheading
6
7 You can also ~~strike through~~ words and denote inline `code`.
8
9
10
```

**Markdown**  
You can emphasize text with **bold**, *italic*,

**Subheading**  
You can also ~~strike through~~ words and de

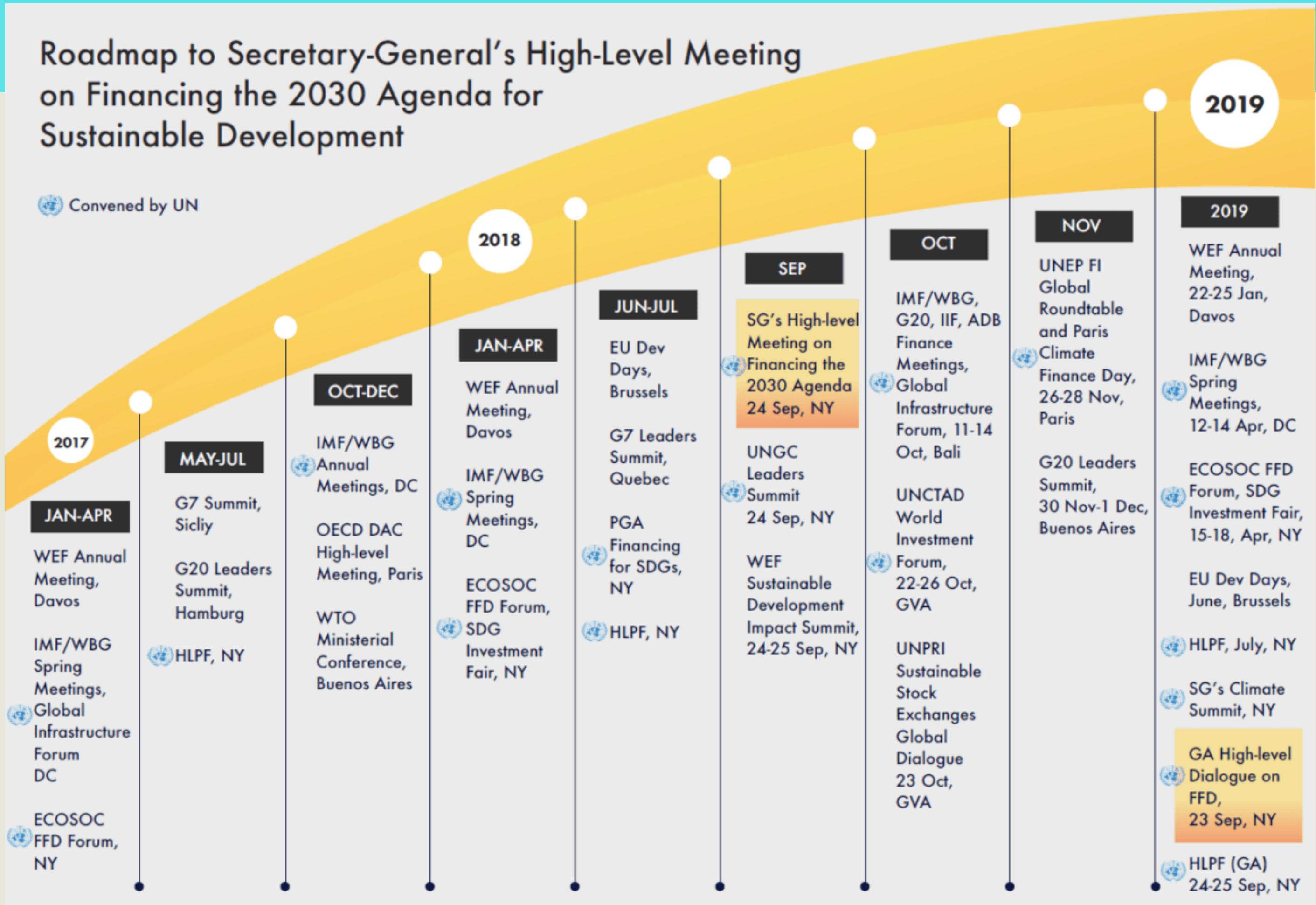
# ROADMAP



<https://www.youtube.com/watch?v=MnrJzXM7a6o>

# ROADMAP

## Roadmap to Secretary-General's High-Level Meeting on Financing the 2030 Agenda for Sustainable Development





## ROADMAP

## 2016-17 CCG Mobile Product Roadmap

Schedule represents front-end of [RTS](#)

BDW = Broadwell	BSW = Braswell
SKL = Skylake	APL = Apollo Lake
KBL = Kaby Lake	GLK = Gemini Lake
CNL = Cannon Lake	CHT = Cherry Trail
CFL = Coffee Lake	

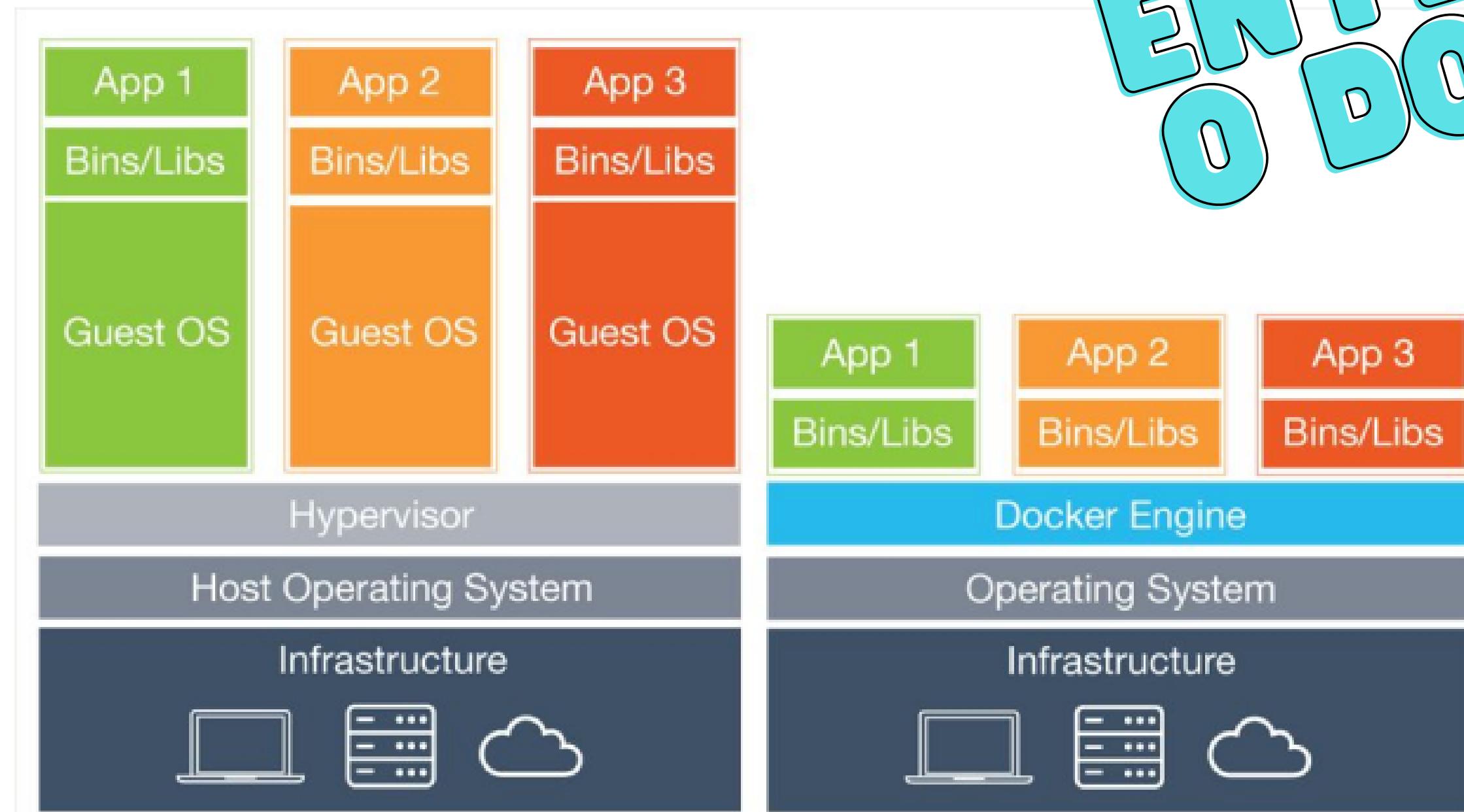


	Q2'16	Q3'16	Q4'16	Q1'17	Q2'17	Q3'17	Q4'17	Q1'18	Q2'18
H Processor	<b>Skylake</b> 45W, 2-chip BGA							QC GT4e	QC GT2 <b>CFL</b> 45W
	<b>Skylake</b> 45W, 2-chip BGA	QC GT2	<b>Kaby Lake</b> 45W, 2-chip BGA					QC GT2	
U Processor	<b>Skylake</b> 15W/28W, SoC BGA		GT3e	<b>Kaby Lake</b> 15W/28W, SoC BGA				GT3e	<b>CFL</b> 15W/28W QC GT3e
	<b>Skylake</b> 15W SoC BGA GT2		<b>Kaby Lake</b> 15W, SoC BGA				GT2	<b>CNL</b> 15W, SoC BGA	GT2
Y Processor	<b>Skylake</b> 4.5W, SoC BGA	GT2	<b>Kaby Lake</b> 4.5W, SoC BGA				GT2	<b>CNL</b> 5.2W, SoC BGA	GT2
N Processor	<b>BSW</b> 4W/6W, SoC BGA	QC	<b>Apollo Lake</b> 4W/6W, SoC BGA				QC	<b>GLK</b> 4W/6W, SoC BGA	QC



## DEVOPS e CONTAINERS

VAMOS  
ENTENDER  
O DOCKER





## DOCKER

**Container: um processo isolado do resto do sistema por meio de abstrações criado pelo SO. O nível de isolamento pode ser controlado, permitindo o acesso a recursos do hospedeiro. O conteúdo do sistema de arquivos vem de uma imagem.**

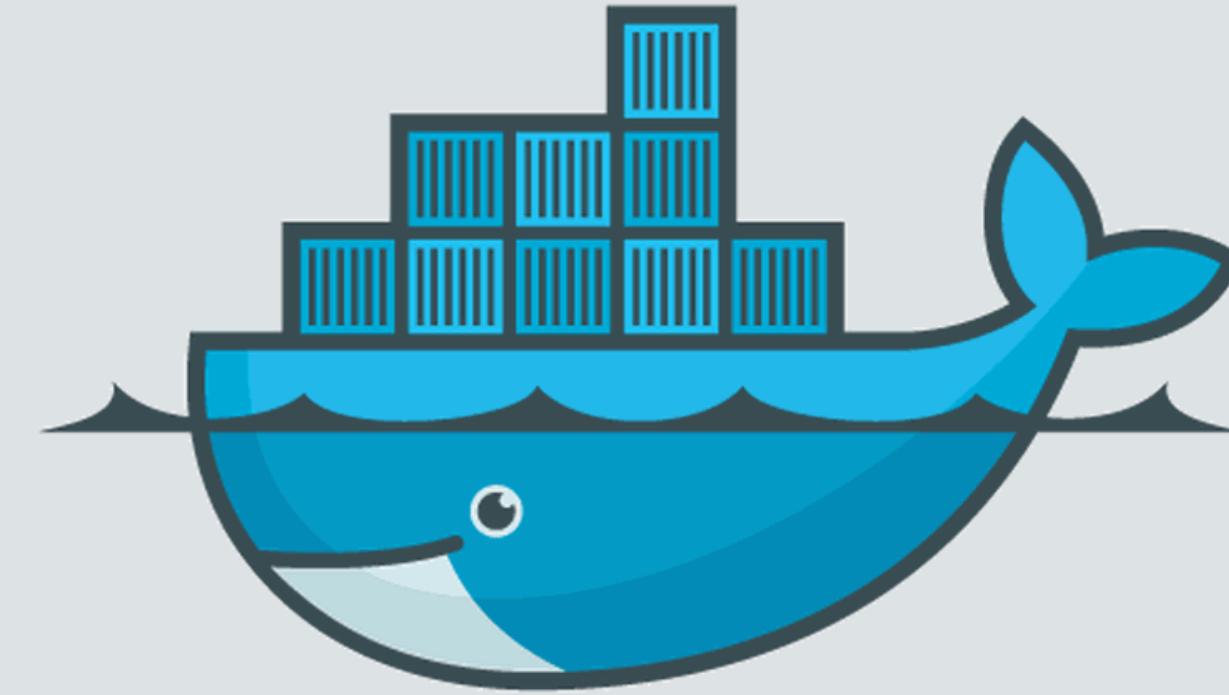
- **Imagen: pacote executável independente que inclui tudo o que é necessário para executar um pedaço de software (código, bibliotecas de tempo de execução, arquivos de configuração). fornece o sistema de arquivos e metadados (por exemplo, variáveis de ambiente, diretório de trabalho inicial) para o recipiente.**



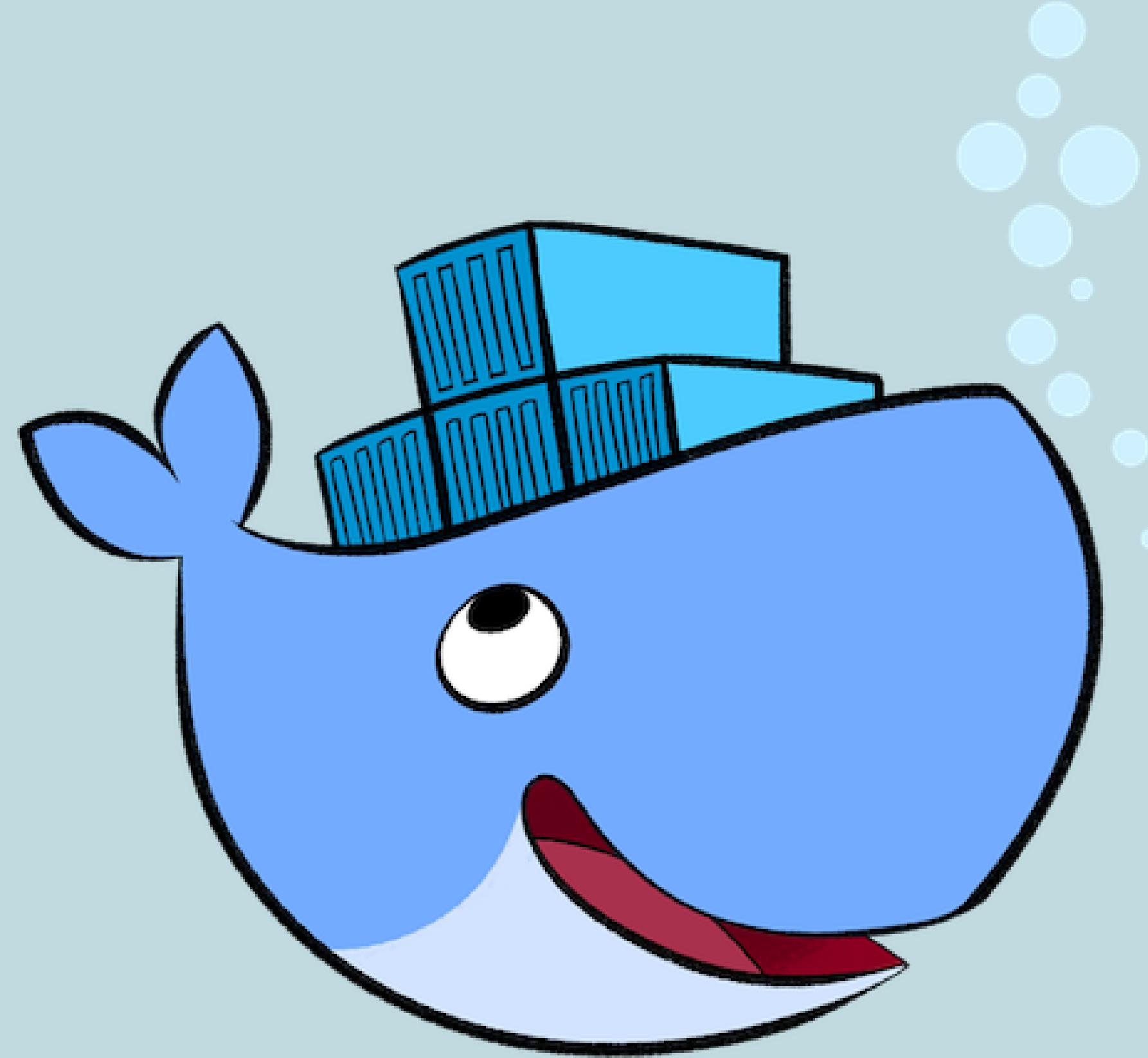
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## DOCKER



[https://colab.research.google.com/drive/1XWGtGYREOz5\\_ReXJXYUB1mwDxVuVYGp?usp=sharing](https://colab.research.google.com/drive/1XWGtGYREOz5_ReXJXYUB1mwDxVuVYGp?usp=sharing)



<https://labs.play-with-docker.com/#>



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## DEVOPS e CONTAINERS

**docker run hello-world**

Since you did not create any image for a docker app hello-world, it will go fetch one from docker repositories and run it!

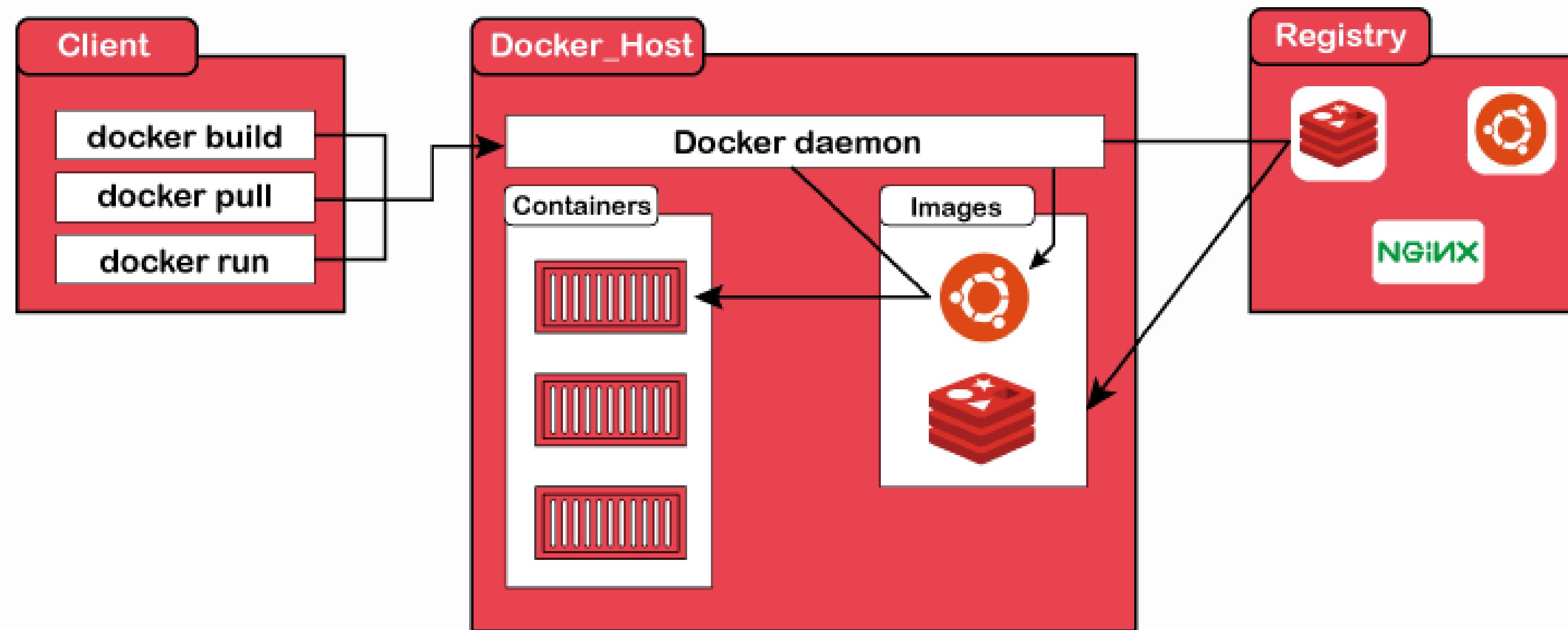
**docker –version**

It will display the version of docker you installed and are running.

#3 Hello World



## Como o Docker Funciona





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## Criando Docker para uma aplicação WEB

#3 Hello World

8 lines (5 sloc) | 222 Bytes

```
1 FROM nginx
2 ENV AUTHOR=Docker
3
4 WORKDIR /usr/share/nginx/html
5 COPY Hello_docker.html /usr/share/nginx/html
6
7 CMD cd /usr/share/nginx/html && sed -e s/Docker/"$AUTHOR"/ Hello_docker.html > index.html ; nginx -g 'daemon off;'
8
```

```
# our base image
FROM alpine:3.5

# Install python and pip
RUN apk add --update py2-pip

# upgrade pip
RUN pip install --upgrade pip

# install Python modules needed by the Python app
COPY requirements.txt /usr/src/app/
RUN pip install --no-cache-dir -r /usr/src/app/requirements.txt

# copy files required for the app to run
COPY app.py /usr/src/app/
COPY templates/index.html /usr/src/app/templates/

# tell the port number the container should expose
EXPOSE 5000

# run the application
CMD ["python", "/usr/src/app/app.py"]
```

**<https://github.com/docker/labs/tree/master/beginner>**

# Agora vamos aprender a lidar com Dados



# O QUE É CIÊNCIA DE DADOS?





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## Site para aprender

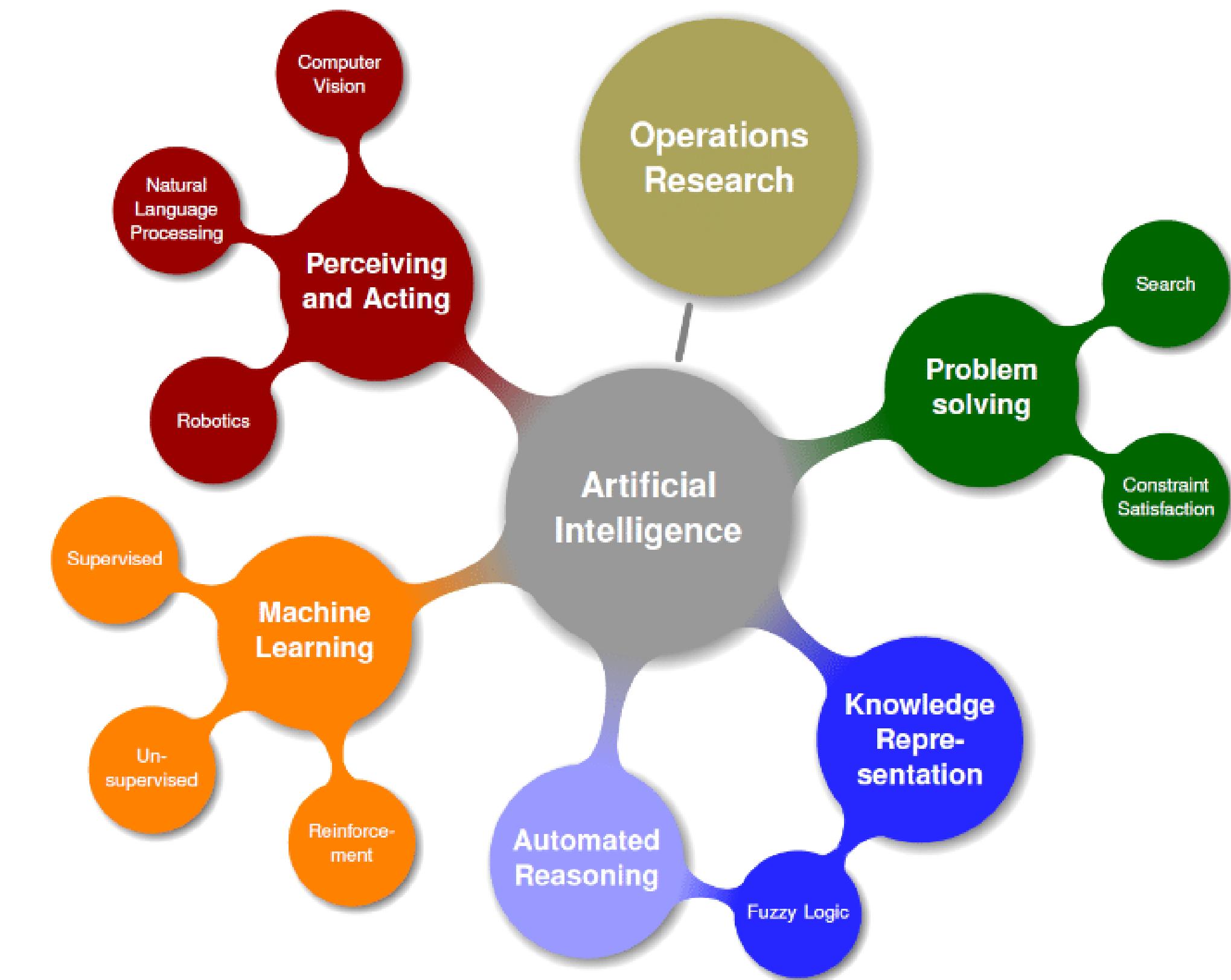
Curso de Aprendizado de Máquina  
<https://chrisalbon.com/>

CHRIS ALBON

TECHNICAL NOTES ▾ ARTICLES

Notes On Using  
**Data Science & Artificial Intelligence**  
To Fight For Something That Matters

I am a data scientist with a decade of experience applying statistical learning, artificial intelligence, and machine learning to difficult problems in a variety of fields.





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## Porque Dados são Importantes

Data is Power



Data contains value and knowledge



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## Dados são o novo petroleo

“Dados são o novo Petróleo”



**Perry Rotella**  
Contributor

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TECH

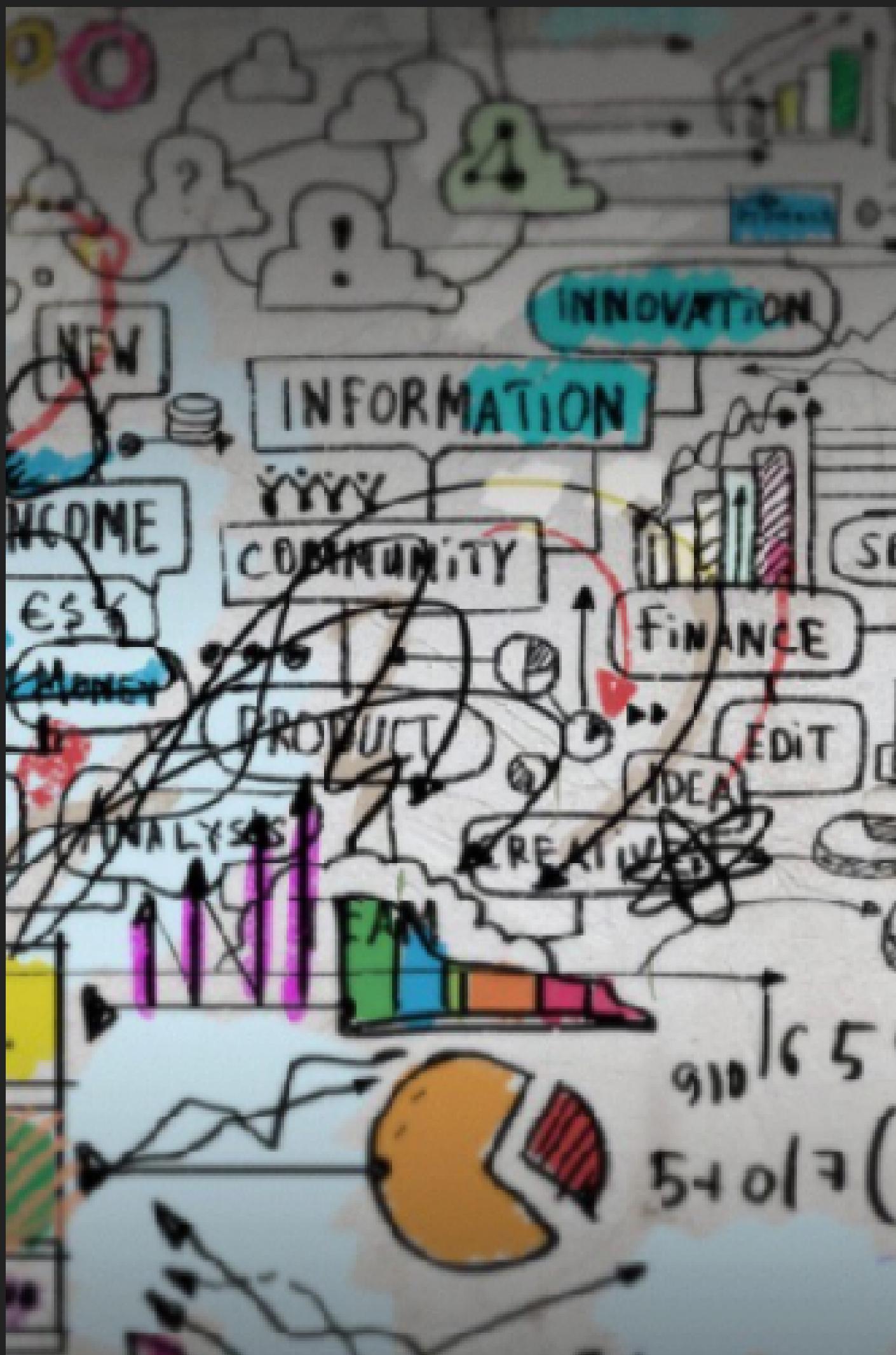
4/02/2012 @ 11:09AM | 10,791 views

## Is Data The New Oil?

[+ Comment Now](#)   [+ Follow Comments](#)

Recently, on a CNBC Squawk Box segment, “[The Pulse of Silicon Valley](#),” host Joe Kernan posed the question, “What is the next really big thing?” to [Ann Winblad](#), the legendary investor and senior partner at Hummer-Winblad. Her response: “Data is the new oil.”

Como petróleo, precisam ser refinados !



DATA SCIENCE É MAIS  
UM TERMO USADO  
PARA DESCREVER O  
PROCESSO DE  
TRANSFORMAÇÃO DE  
DADOS EM  
CONHECIMENTO.  
(LOUKIDES, 2016)

# MODERN DATA SCIENTIST

Data Scientist, the sexiest job of the 21th century, requires a mixture of multidisciplinary skills ranging from an intersection of mathematics, statistics, computer science, communication and business. Finding a data scientist is hard. Finding people who understand who a data scientist is, is equally hard. So here is a little cheat sheet on who the modern data scientist really is.

## MATH & STATISTICS

- ★ Machine learning
- ★ Statistical modeling
- ★ Experiment design
- ★ Bayesian inference
- ★ Supervised learning: decision trees, random forests, logistic regression
- ★ Unsupervised learning: clustering, dimensionality reduction
- ★ Optimization: gradient descent and variants



## DOMAIN KNOWLEDGE & SOFT SKILLS

- ★ Passionate about the business
- ★ Curious about data
- ★ Influence without authority
- ★ Hacker mindset
- ★ Problem solver
- ★ Strategic, proactive, creative, innovative and collaborative

## PROGRAMMING & DATABASE

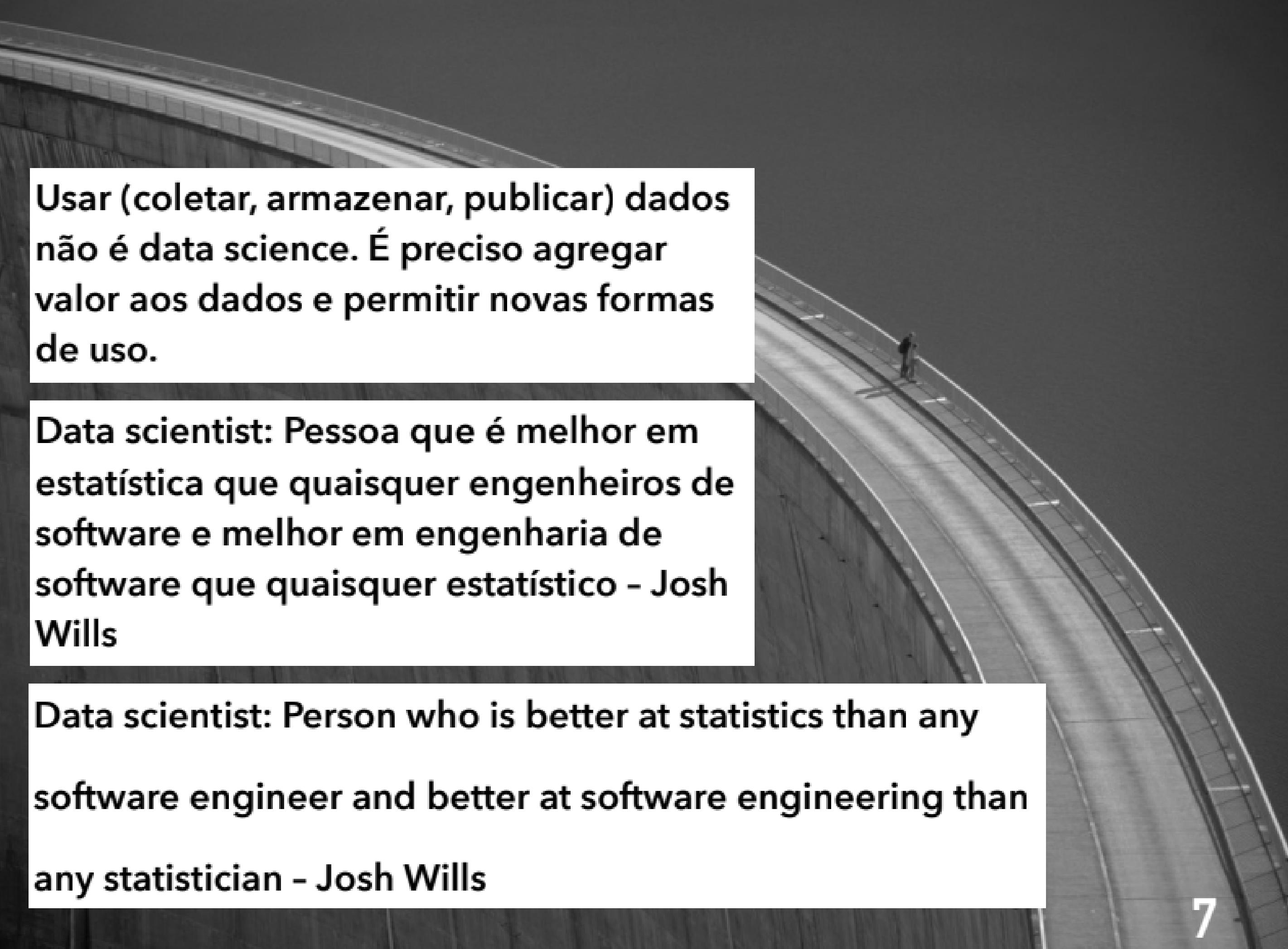
- ★ Computer science fundamentals
- ★ Scripting language e.g. Python
- ★ Statistical computing packages, e.g., R
- ★ Databases: SQL and NoSQL
- ★ Relational algebra
- ★ Parallel databases and parallel query processing
- ★ MapReduce concepts
- ★ Hadoop and Hive/Pig
- ★ Custom reducers
- ★ Experience withaaS like AWS

## COMMUNICATION & VISUALIZATION

- ★ Able to engage with senior management
- ★ Story telling skills
- ★ Translate data-driven insights into decisions and actions
- ★ Visual art design
- ★ R packages like ggplot or lattice
- ★ Knowledge of any of visualization tools e.g. Flare, D3.js, Tableau

# CIENTISTA DE DADOS

- **Matemática e estatística**
- **Banco de Dados e Programação**
- **Conhecimento de Negócio**
- **Comunicação**



**Usar (coletar, armazenar, publicar) dados não é data science. É preciso agregar valor aos dados e permitir novas formas de uso.**

**Data scientist: Pessoa que é melhor em estatística que quaisquer engenheiros de software e melhor em engenharia de software que quaisquer estatístico - Josh Wills**

**Data scientist: Person who is better at statistics than any software engineer and better at software engineering than any statistician - Josh Wills**



**BIG DATA**

VS



**DATA SCIENCE**

VS



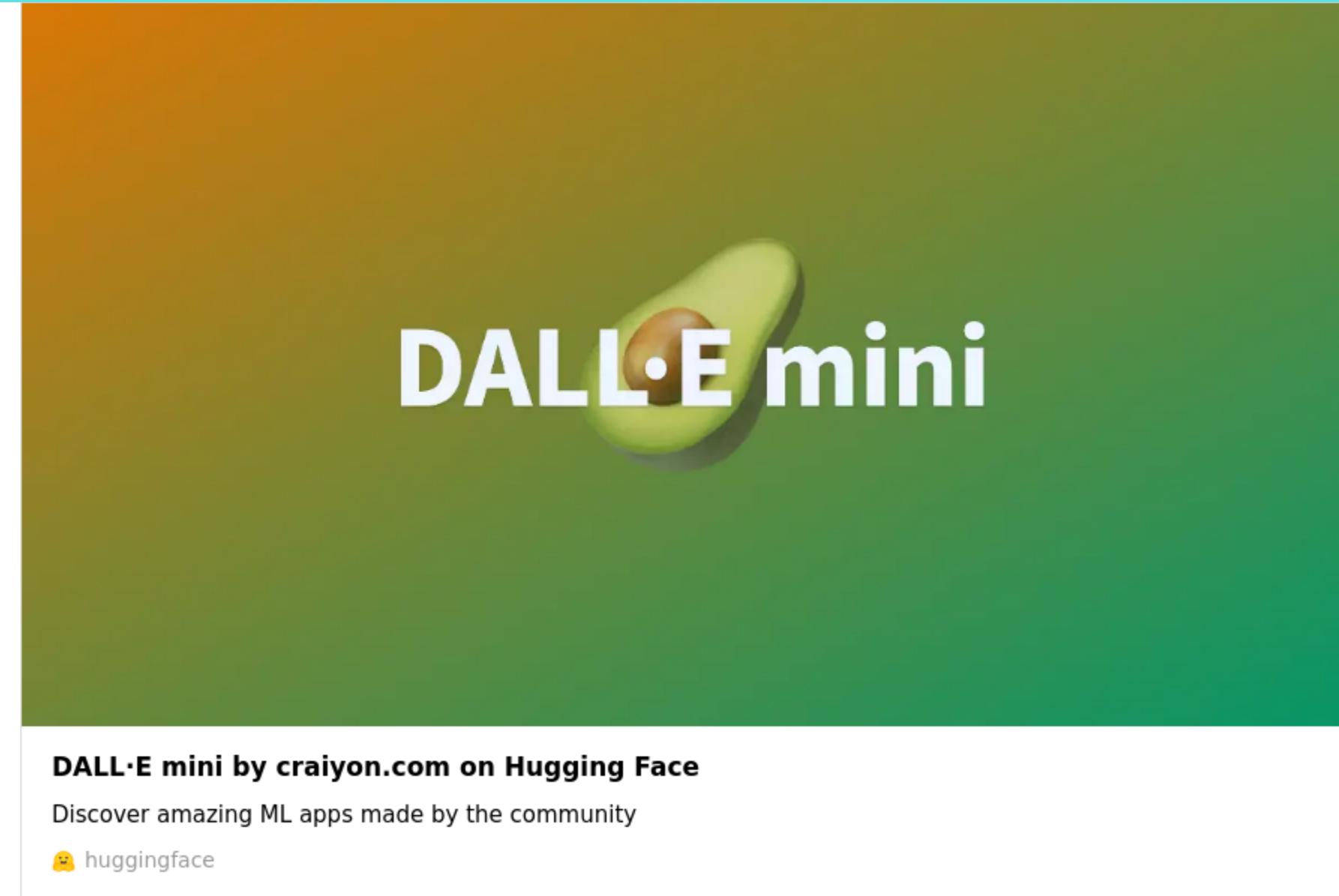
**DATA ANALYTICS**



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## Inteligência artificial gerando conteúdo



<https://huggingface.co/spaces/flax-community/dalle-mini>

Click on the person who is real.



### Which Face Is Real?

Your new friend on Facebook. Your next Tinder match. A potential employee. Sure you've seen their picture — but do they even exist? Learn how to tell.

 callin\_bull

<https://www.whichfaceisreal.com/>

# INDEPENDENT VARIABLE

VARIABLE THAT IS CHANGED

**Amount of Water**



# DEPENDENT VARIABLE

VARIABLE AFFECTED BY THE CHANGE

**Size of Plant**  
**Number of Leaves**  
**Living or Dead?**



INDEPENDENT  
VARIABLE

CAUSE

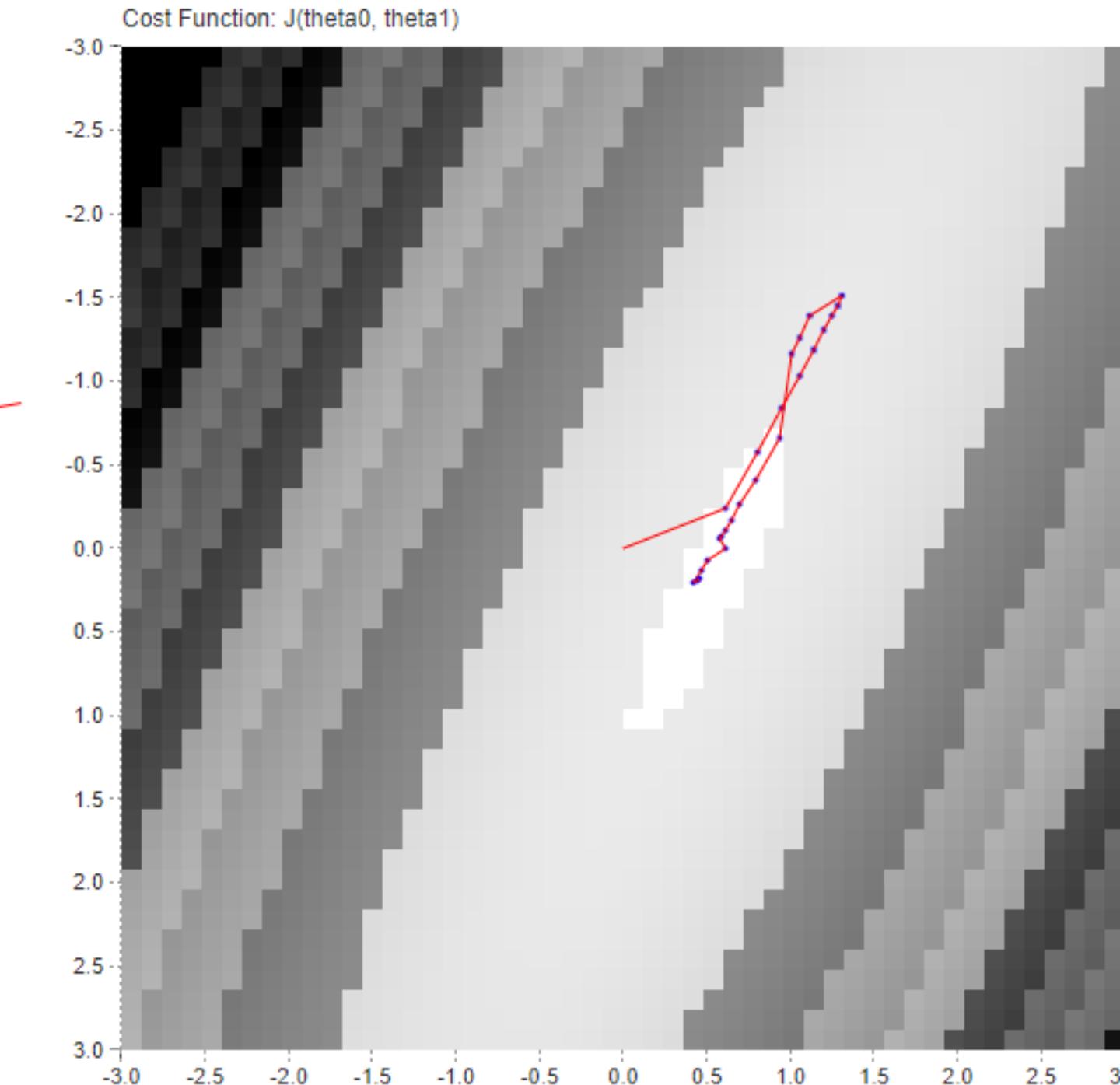
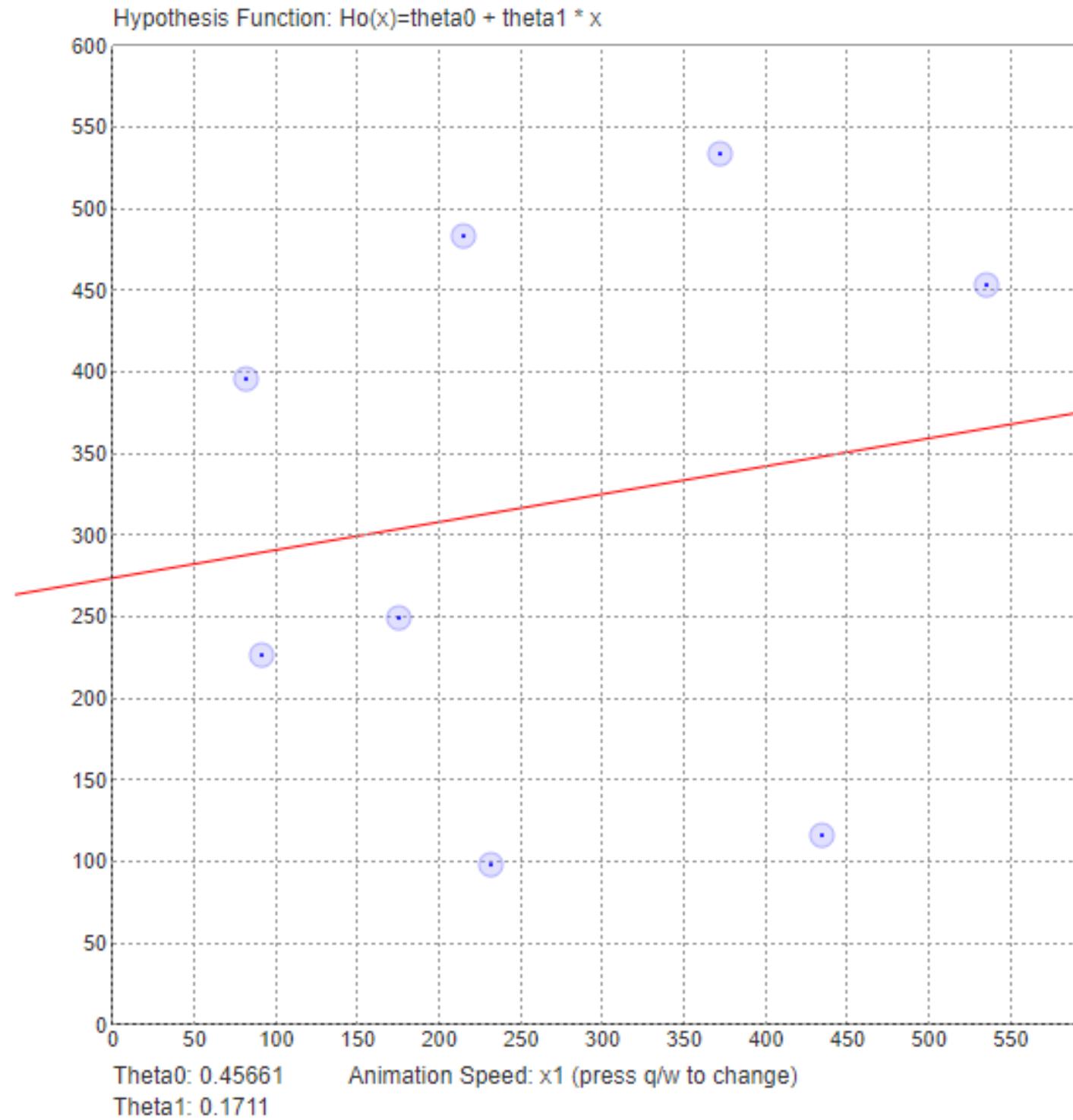


DEPENDENT  
VARIABLE

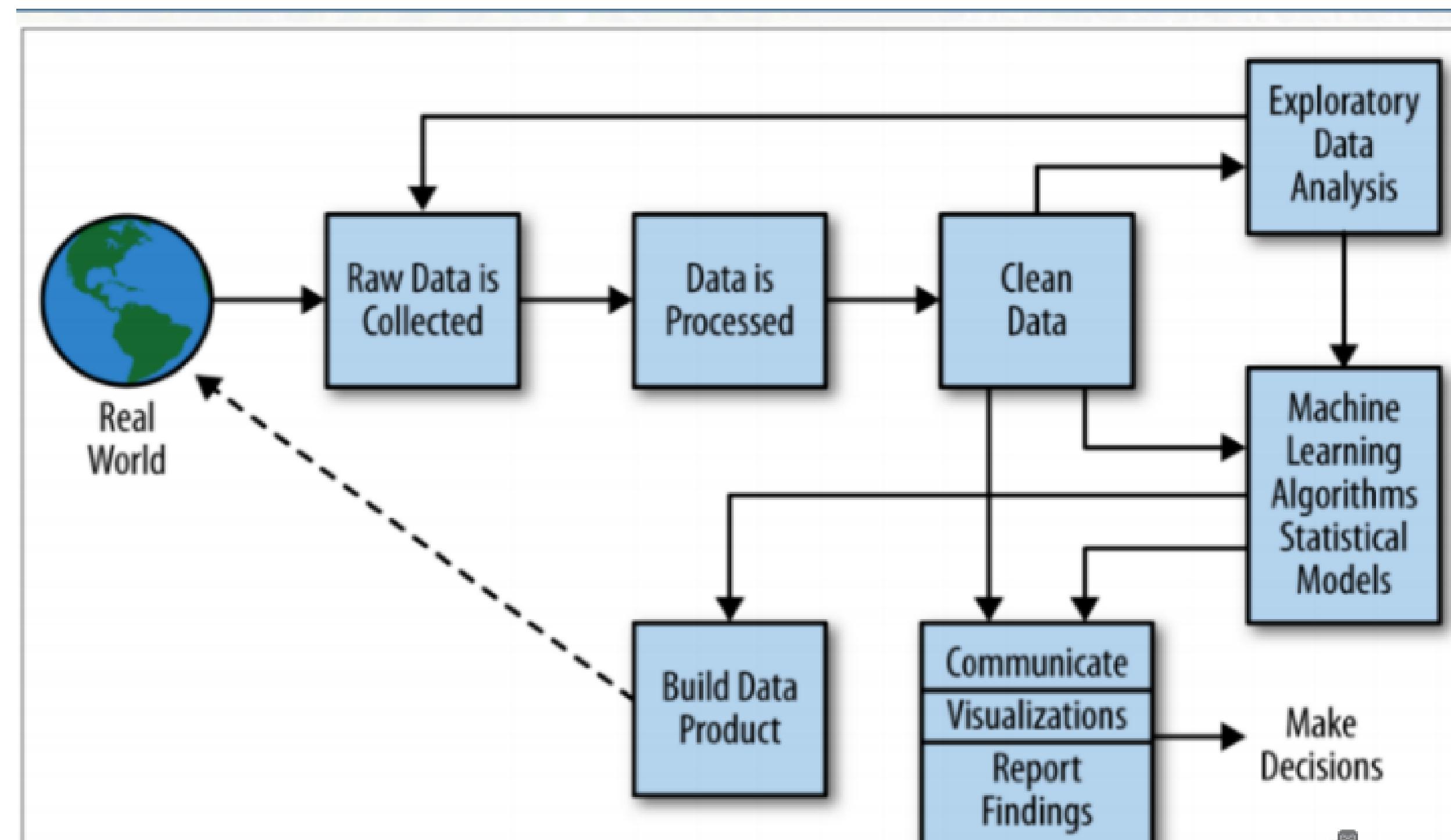
EFFECT

# Interactive demonstration of the Gradient Descent algorithm

Click on the hypothesis function graph (below) to add features. At least 2 features are required to start animation. [Gradient Descent on Wiki](#).



## Análise de Dados é um Processo





Dados são coletados

## COLETAR E PROCESSAR OS DADOS

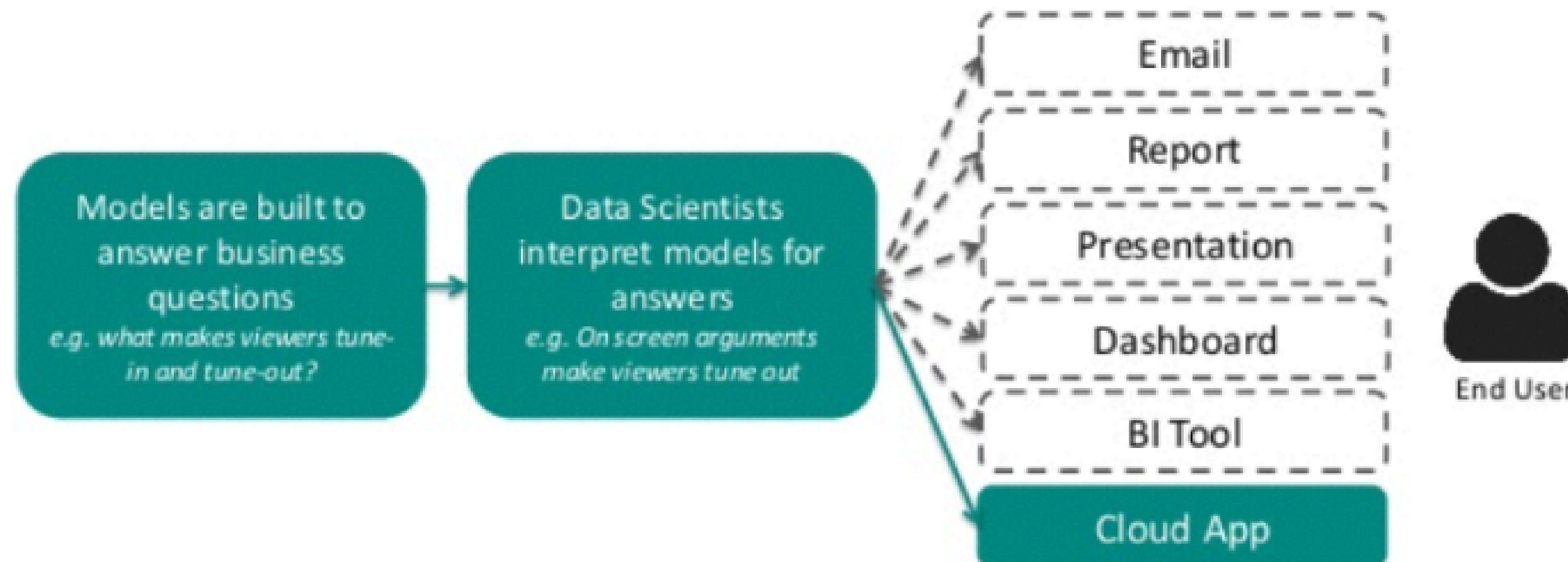
- Conduzir experimento de pesquisa.
- Coletar amostras de uma população.
- Transformar , filtrar e summarizar os dados.
- Preparar os dados para o modelo escolhido



## O que é insight?

# Models → Insights → Actions

*A good insight drives action that will generate value for stakeholders*







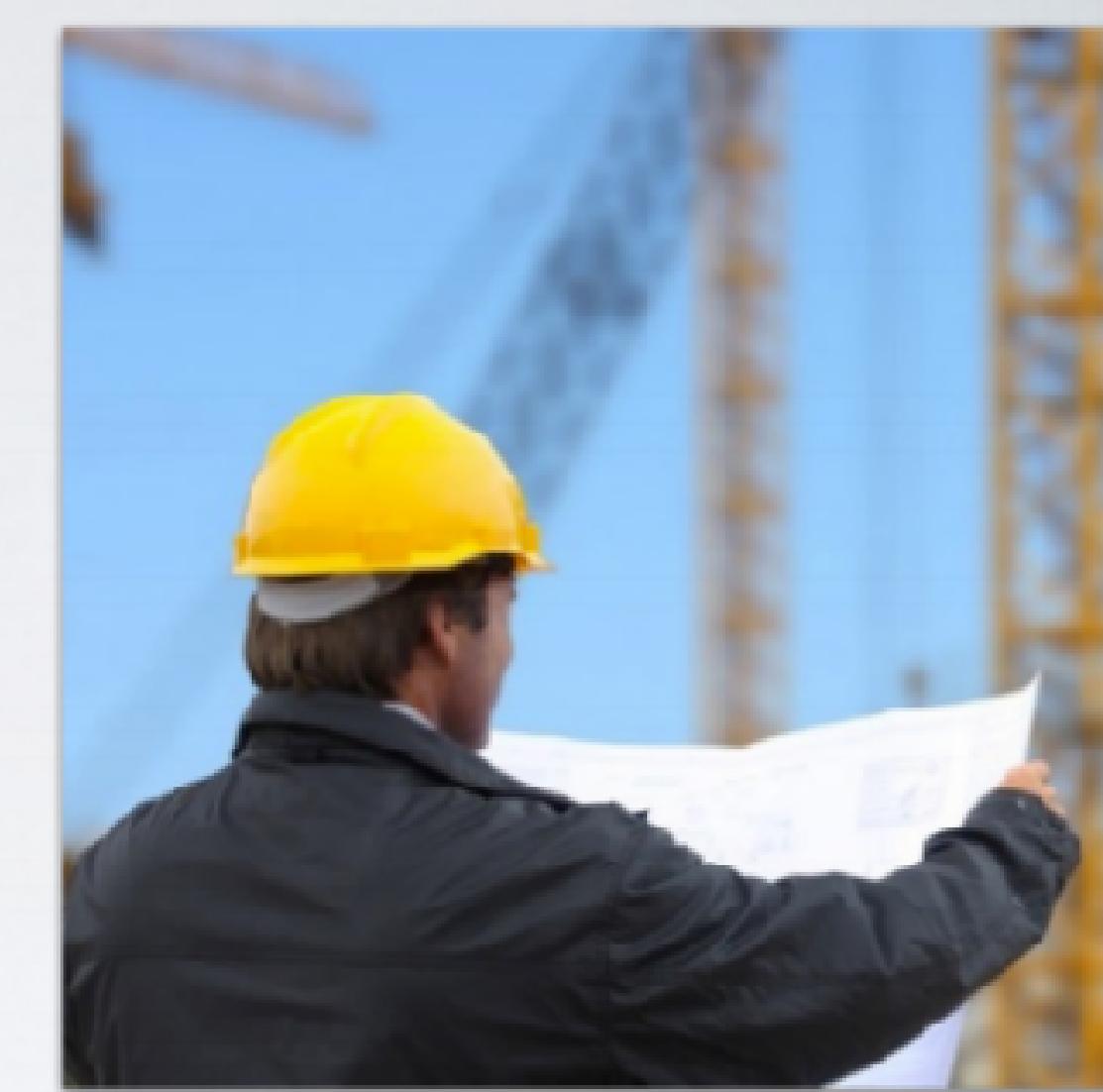
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## Tipos de Análise de Dados



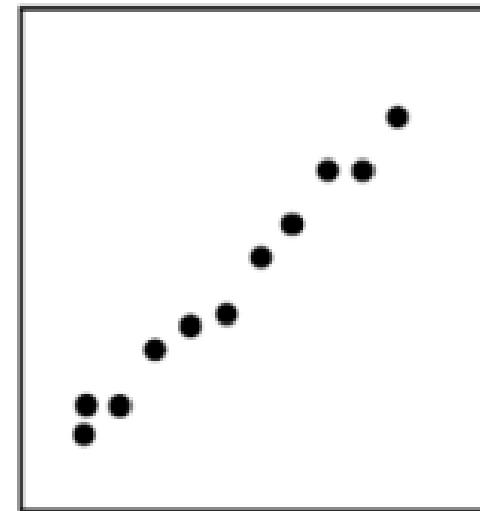
**Investigative Analytics**



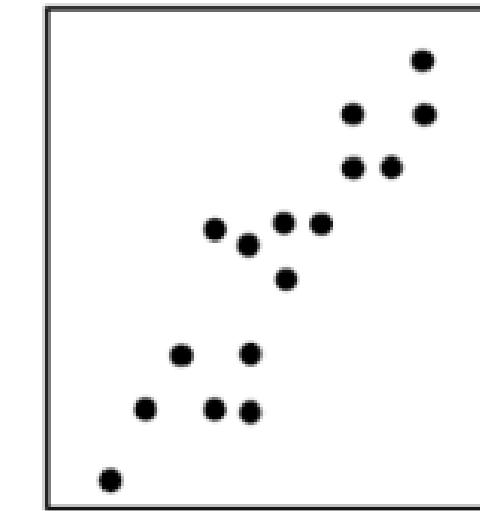
**Operational Analytics**



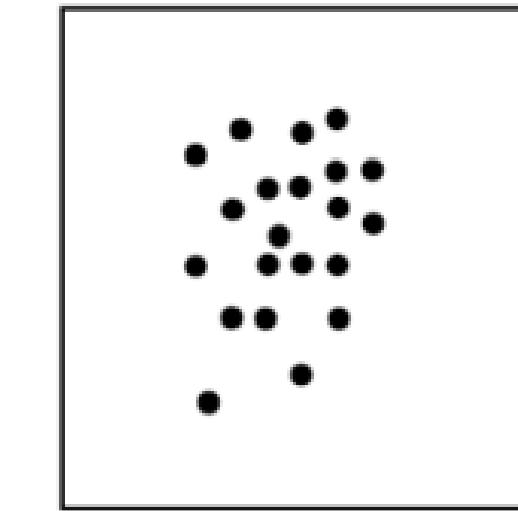
## Correlação de Dados



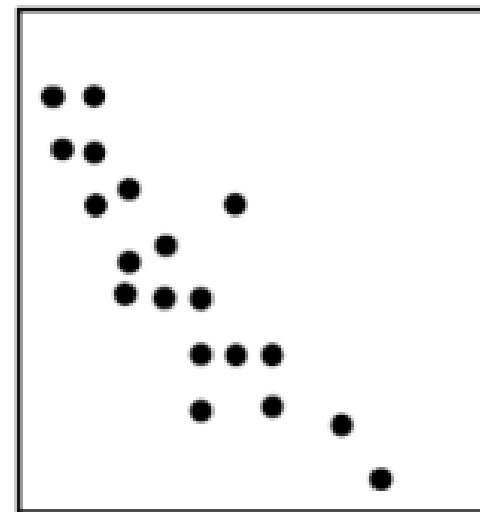
Strong positive correlation



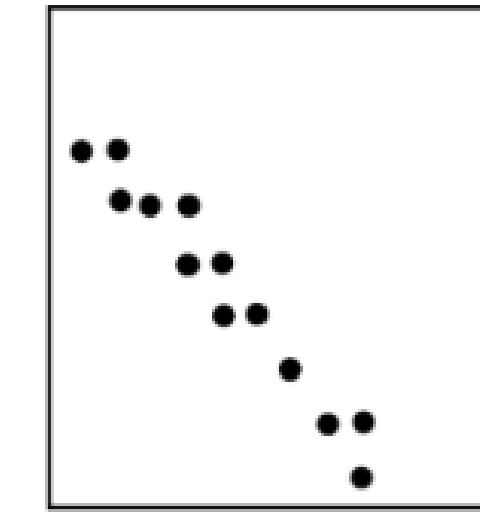
Moderate positive correlation



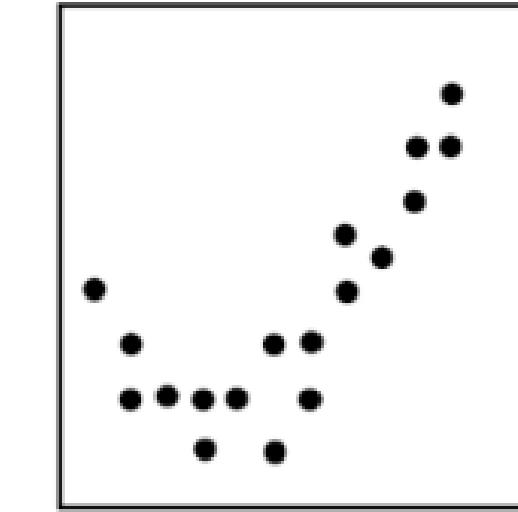
No correlation



Moderate negative correlation



Strong negative correlation

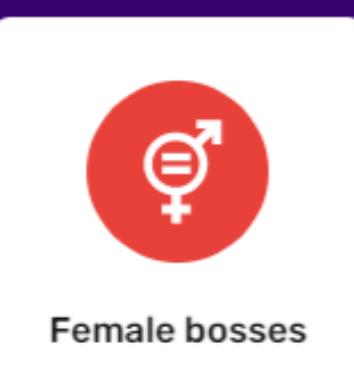


Curvilinear relationship

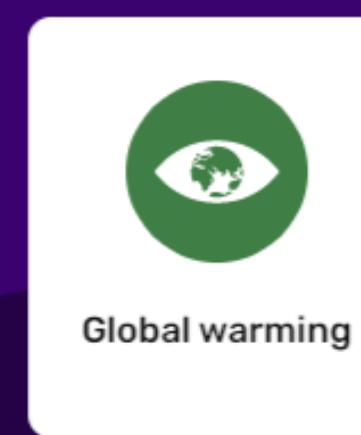
Search



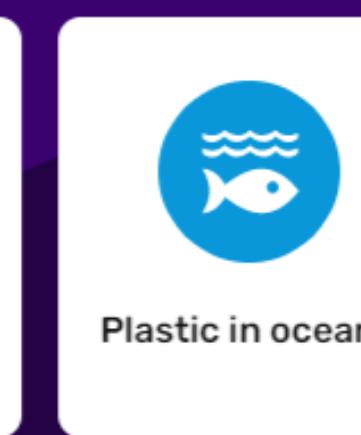
# You are probably wrong about



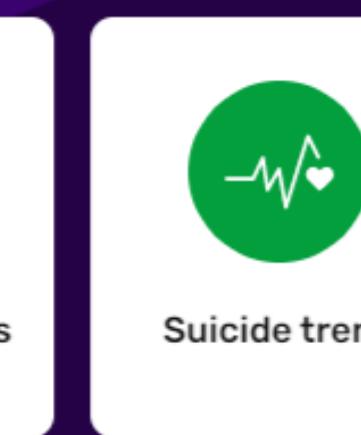
Female bosses



Global warming



Plastic in oceans



Suicide trend



Import taxes



Poor vs. poor



We have tested thousands of people and they were systematically wrong about all this.

[Upgrade your worldview](#)

Gapminder is an independent educational non-profit fighting global misconceptions.

FEATURED BY:



Bloomberg



DERSTANDARD

EL PAÍS



la Repubblica



McKinsey&Company

NewScientist



The Guardian

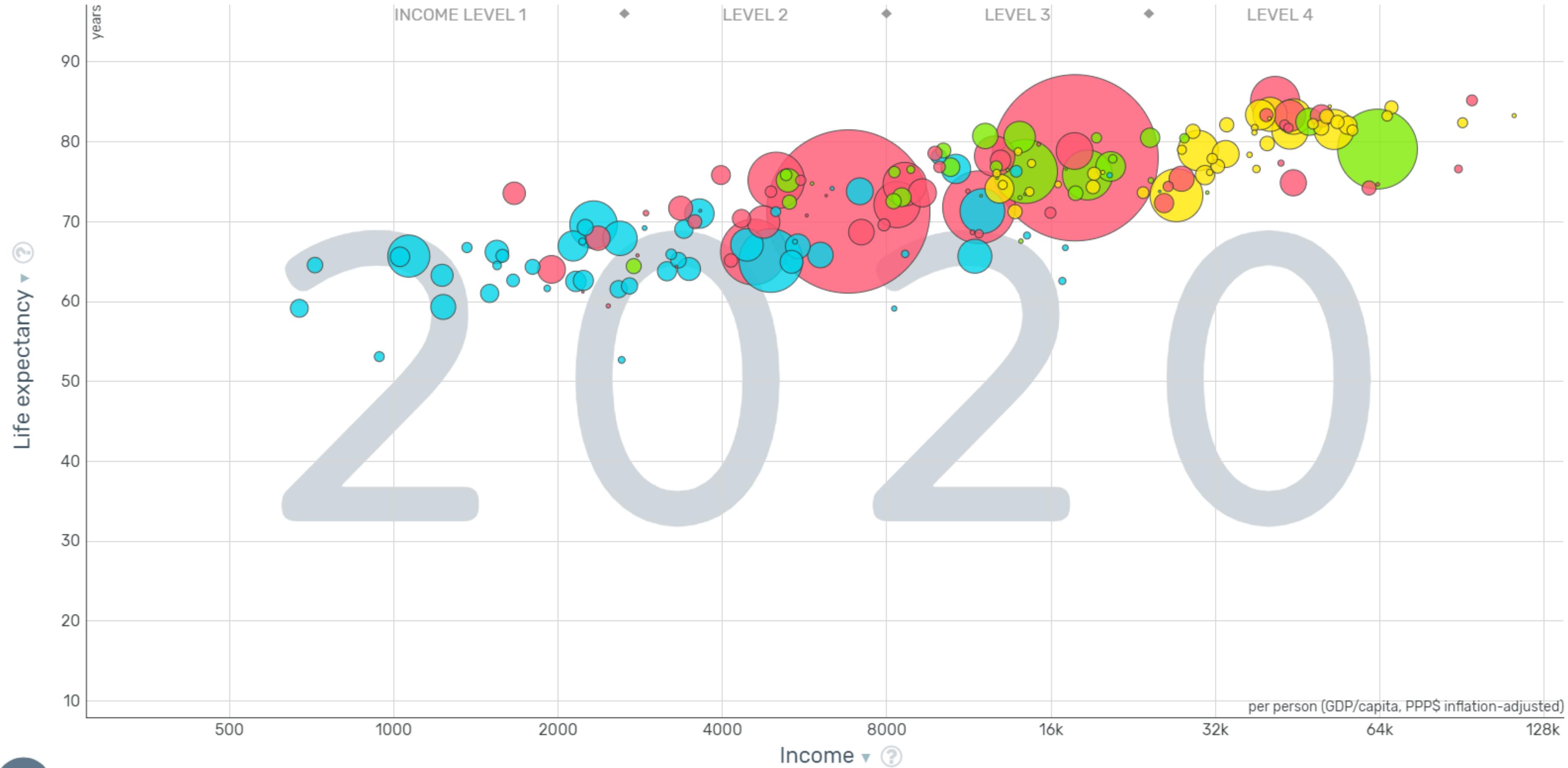
TIME

unicef



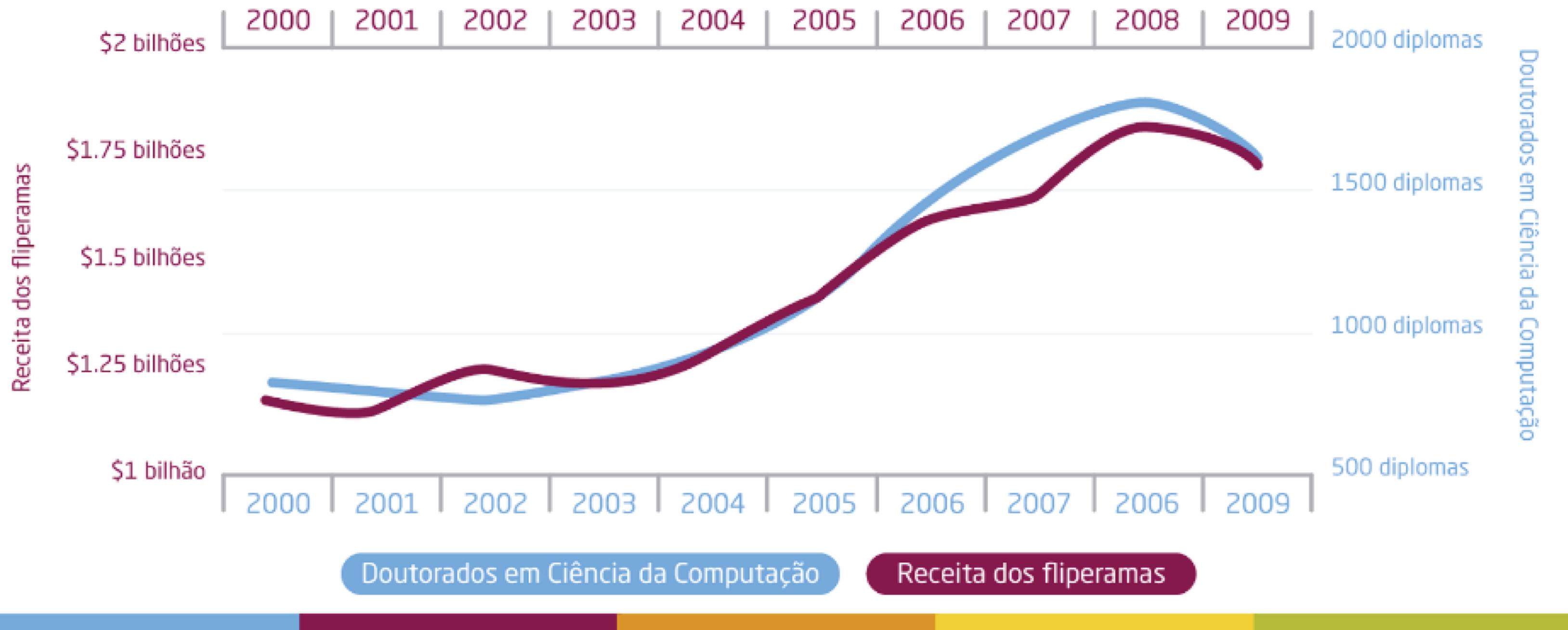
World Health Organization

WOMEN DELIVER

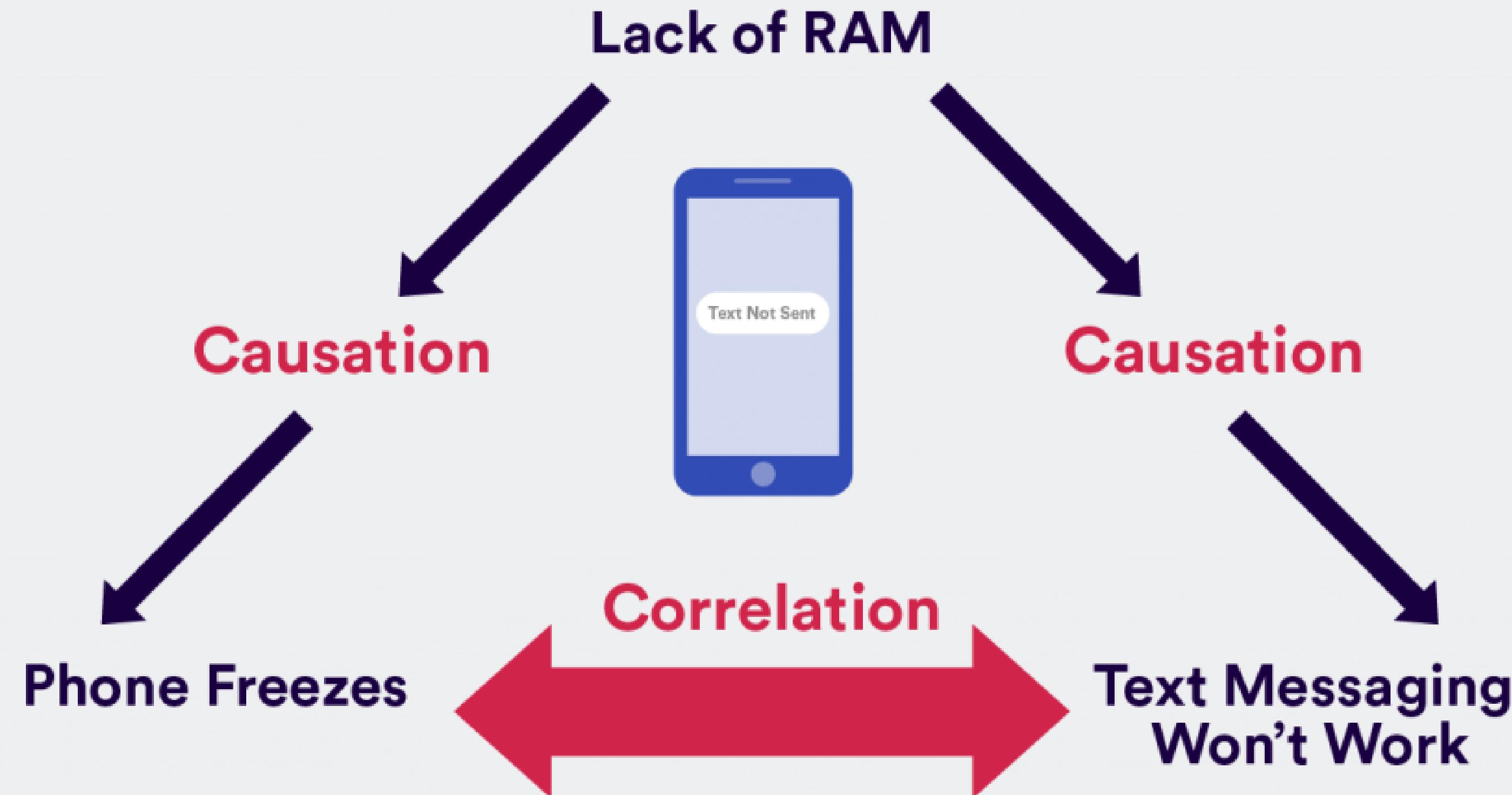


[https://www.gapminder.org/tools/#\\$chart-type=bubbles&url=v1](https://www.gapminder.org/tools/#$chart-type=bubbles&url=v1)

# RECEITA TOTAL GERADA POR FLIPERAMAS CORRELACIONA COM DOUTORADOS EM CIÊNCIA DA COMPUTAÇÃO CONCEDIDOS NOS E.U.A



Referência: <http://www.tylervigen.com/spurious-correlations>



# RELATÓRIOS

- ▶ Notebooks online: iPython, Jupyter
- ▶ permitem a criação de documentos
- ▶ interativos em várias linguagens de análise.
- ▶ “Reproducible Research!”



**Replicação - quando investigadores independentes usam métodos, protocolos, dados e equipamentos para confirmar afirmações científicas.**

**Reprodução - quando conjuntos de dados e códigos de computador são disponibilizados para pesquisadores verificarem os resultados.**

(Peng (2009) Pesquisa reproduzível e Bioestatística. Bioestatística 10: 405-408)



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## Repositórios de Dados



<https://archive.ics.uci.edu/ml/datasets.php>



<https://www.kaggle.com/>



# Vamos aprender a transformar Dados!!!!

	Country	Age	Salary	No	Yes
0	France	44.0	72000.0	1	0
1	Spain	27.0	48000.0	0	1
2	Germany	30.0	54000.0	1	0
3	Spain	38.0	61000.0	1	0
4	Germany	40.0	NaN	0	1
5	France	35.0	58000.0	0	1
6	Spain	NaN	52000.0	1	0
7	France	48.0	79000.0	0	1
8	Germany	50.0	83000.0	1	0
9	France	37.0	67000.0	0	1

## Convert Pandas Categorical Data For Scikit-Learn

20 Dec 2017

### Preliminaries

```
# Import required packages
from sklearn import preprocessing
import pandas as pd
```

### Create DataFrame

```
raw_data = {'patient': [1, 1, 1, 2, 2],
            'obs': [1, 2, 3, 1, 2],
            'treatment': [0, 1, 0, 1, 0],
            'score': ['strong', 'weak', 'normal', 'weak', 'strong']}
df = pd.DataFrame(raw_data, columns = ['patient', 'obs', 'treatment', 'score'])
```

### Fit The Label Encoder

```
# Create a Label (category) encoder object
le = preprocessing.LabelEncoder()
```

```
# Fit the encoder to the pandas column
le.fit(df['score'])
```



# Vamos aprender a transformar Dados!!!!

df

	A	B	C	D
0	1.0	2.0	3.0	4.0
1	5.0	6.0	NaN	8.0
2	0.0	11.0	12.0	NaN

## Delete Observations With Missing Values

20 Dec 2017

### Preliminaries

```
# Load Libraries
import numpy as np
import pandas as pd
```

### Create Feature Matrix

```
# Create feature matrix
X = np.array([[1.1, 11.1],
              [2.2, 22.2],
              [3.3, 33.3],
              [4.4, 44.4],
              [np.nan, 55]])
```

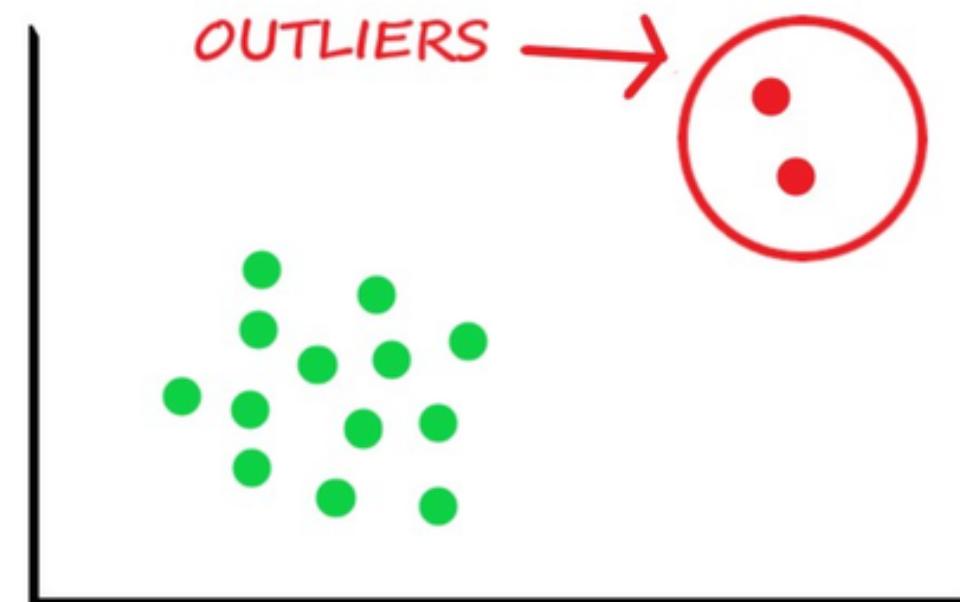
### Delete Observations With Missing Values

```
# Remove observations with missing values
X[~np.isnan(X).any(axis=1)]
```

```
array([[ 1.1,  11.1],
       [ 2.2,  22.2],
       [ 3.3,  33.3],
       [ 4.4,  44.4]])
```



# Vamos aprender a transformar Dados!!!!



## Detecting Outliers

20 Dec 2017

### Preliminaries

```
# Load Libraries
import numpy as np
from sklearn.covariance import EllipticEnvelope
from sklearn.datasets import make_blobs
```

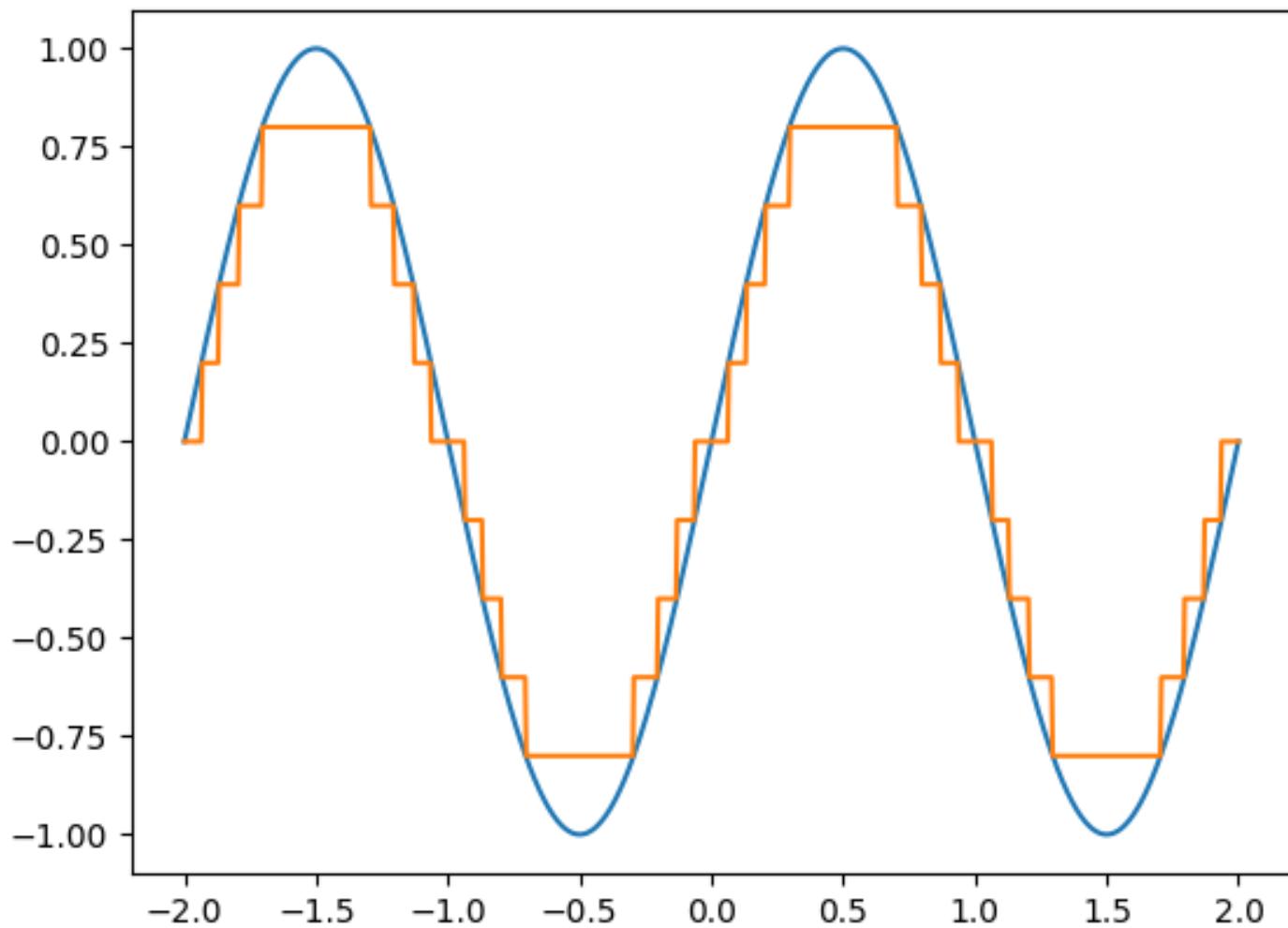
### Create Data

```
# Create simulated data
X, _ = make_blobs(n_samples = 10,
                   n_features = 2,
                   centers = 1,
                   random_state = 1)

# Replace the first observation's values with extreme values
X[0,0] = 10000
X[0,1] = 10000
```



# Vamos aprender a transformar Dados!!!!



## Discretize Features

20 Dec 2017

### Preliminaries

```
# Load Libraries
from sklearn.preprocessing import Binarizer
import numpy as np
```

### Create Data

```
# Create feature
age = np.array([[6],
               [12],
               [20],
               [36],
               [65]])
```

### Option 1: Binarize Feature

```
# Create binarizer
binarizer = Binarizer(18)

# Transform feature
binarizer.fit_transform(age)
```

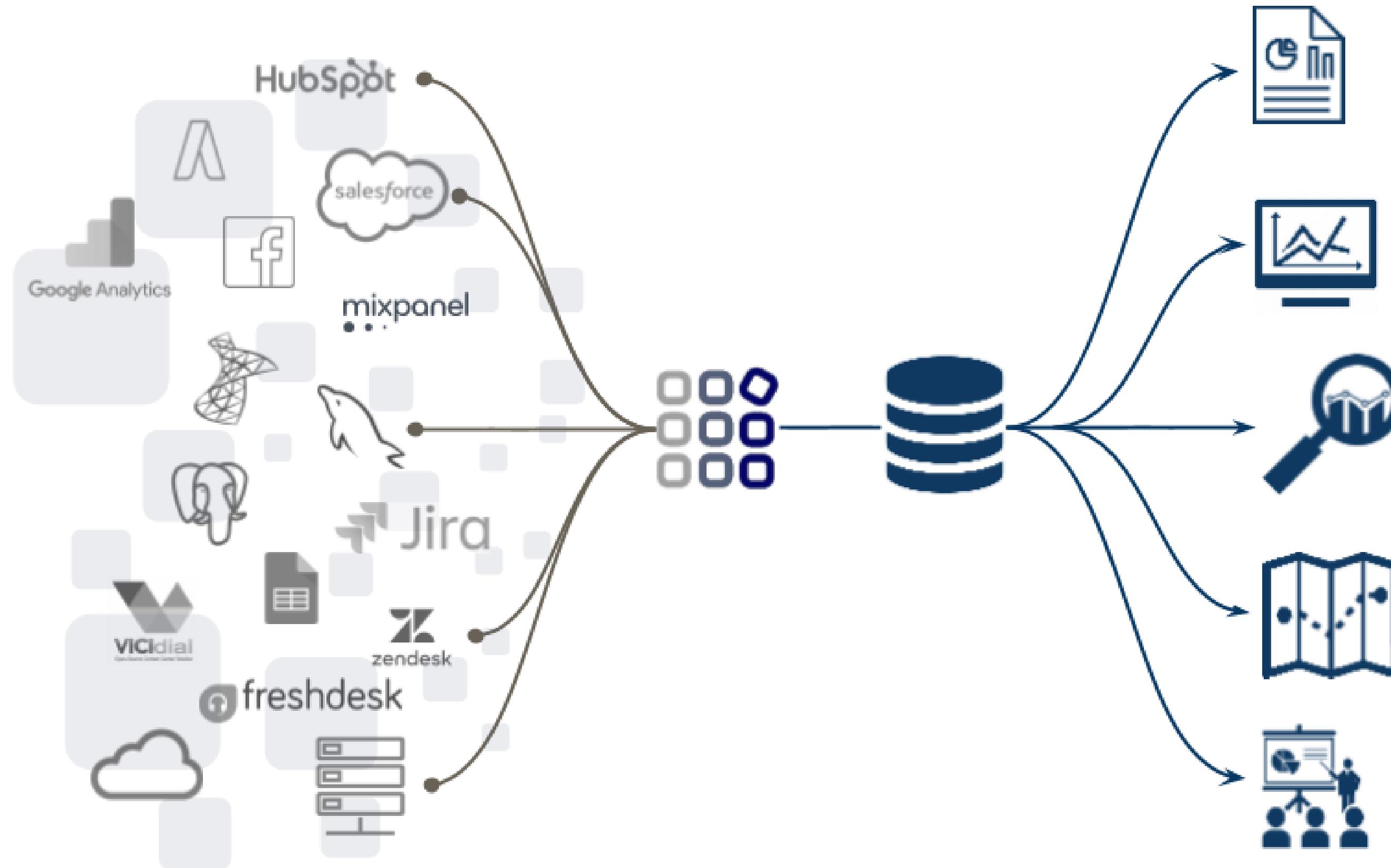


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## Porque precisamos de um DataWarehouse?



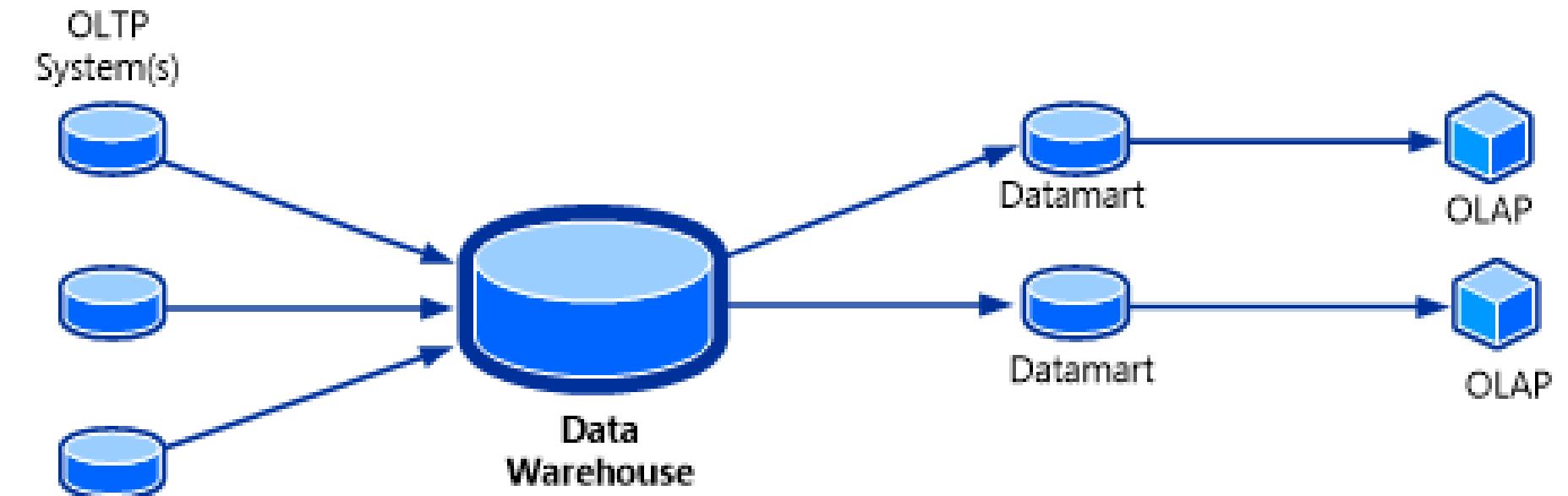




## Vamos aprender a transformar Dados!!!!

### Data Warehouse e OLAP

- *On-Line Analytical Processing*
  - Processamento Analítico On-line (popular para DW)
- A OLAP foi construída para gerar respostas rápidas à consultas analíticas em dados multidimensionais compartilhados
  - Técnica:
    - Tira uma foto (snapshot) dos dados (que vai usar)
    - Estrutura os dados num cubo dimensional
    - Processa a consulta usando o cubo
  - Consultas complexas: gasta menos de 1% do DBMS
  - Exemplo: Weekly da Tupperware

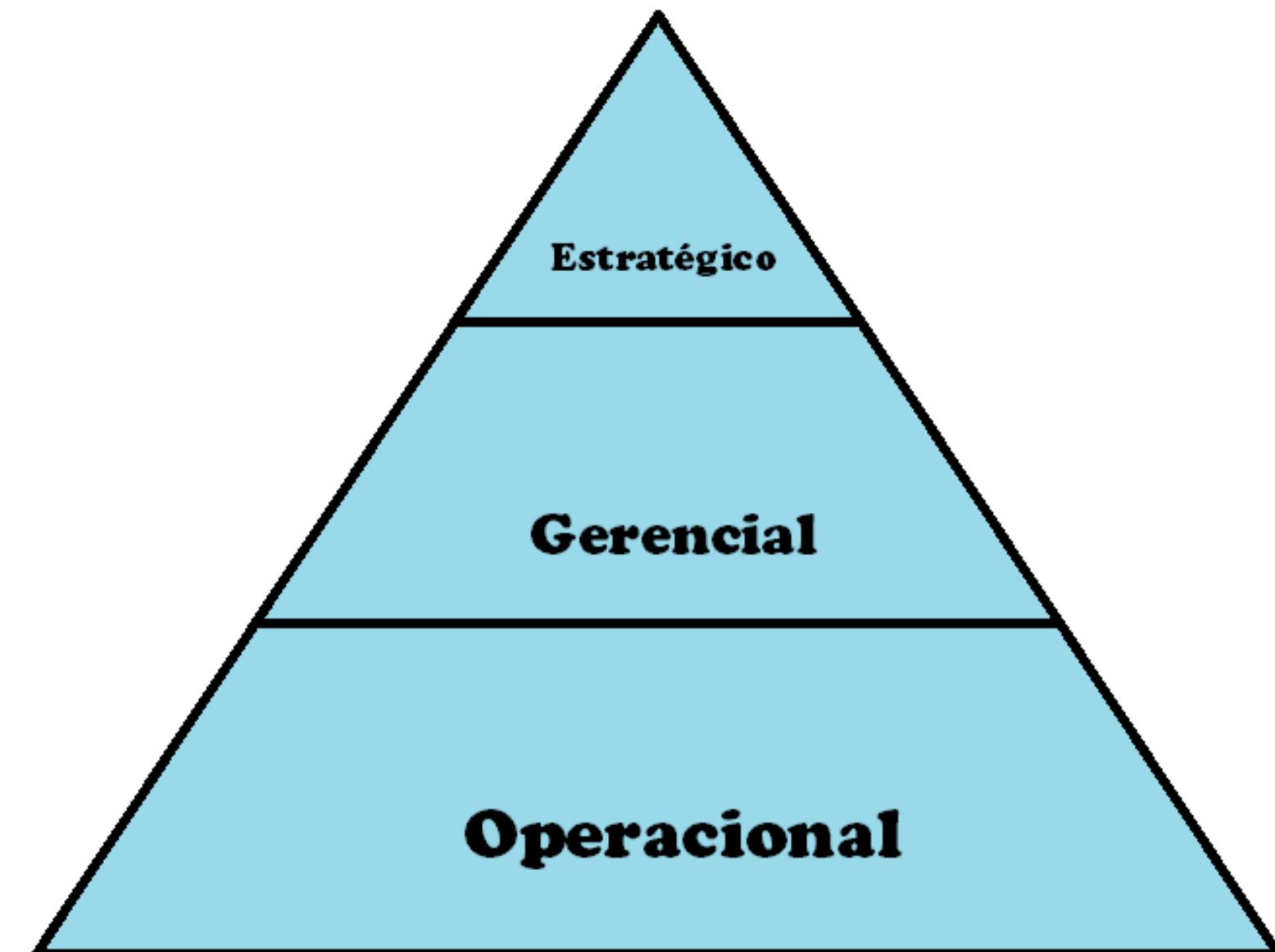
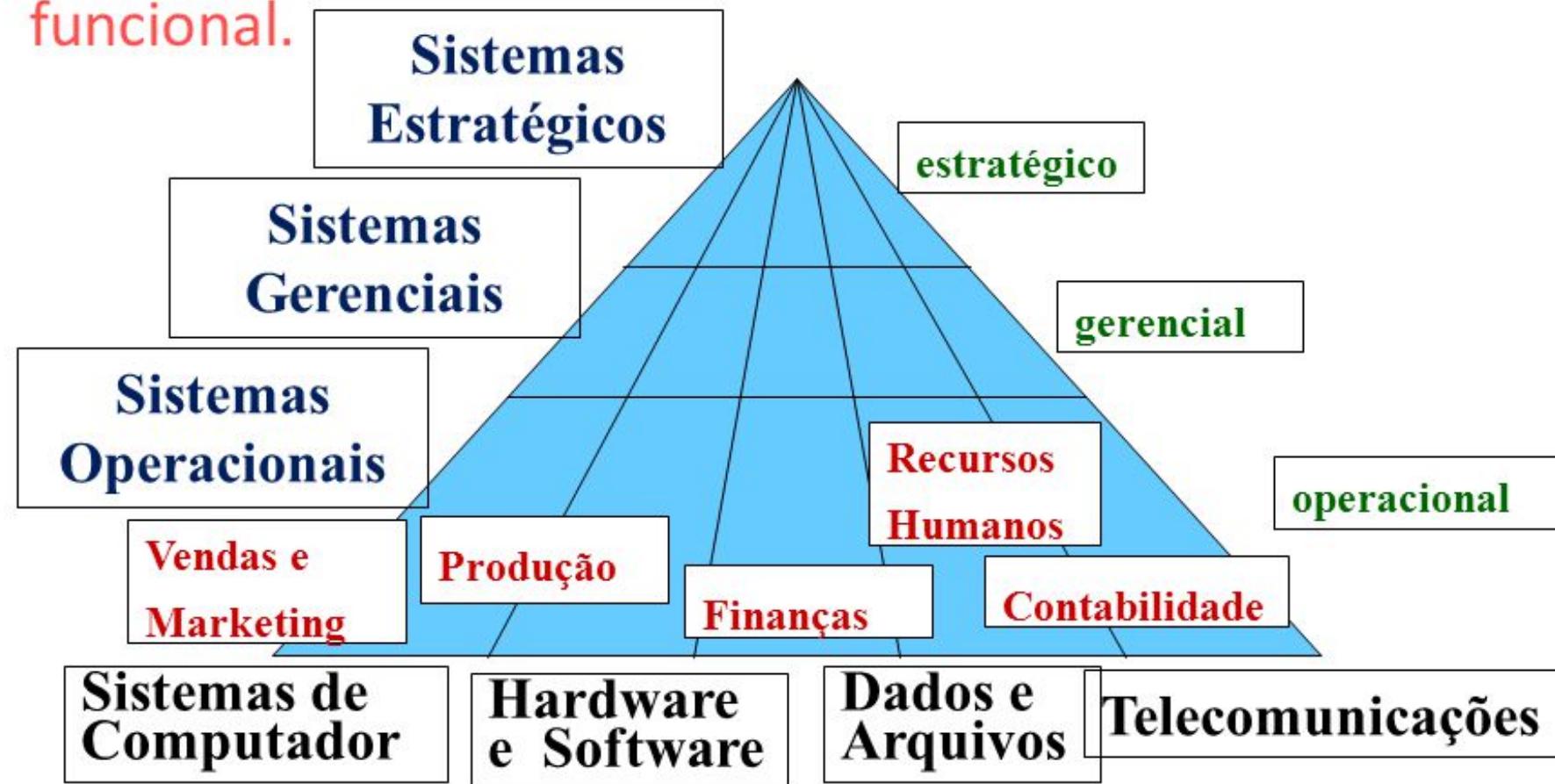




Vamos aprender a transformar Dados!!!!

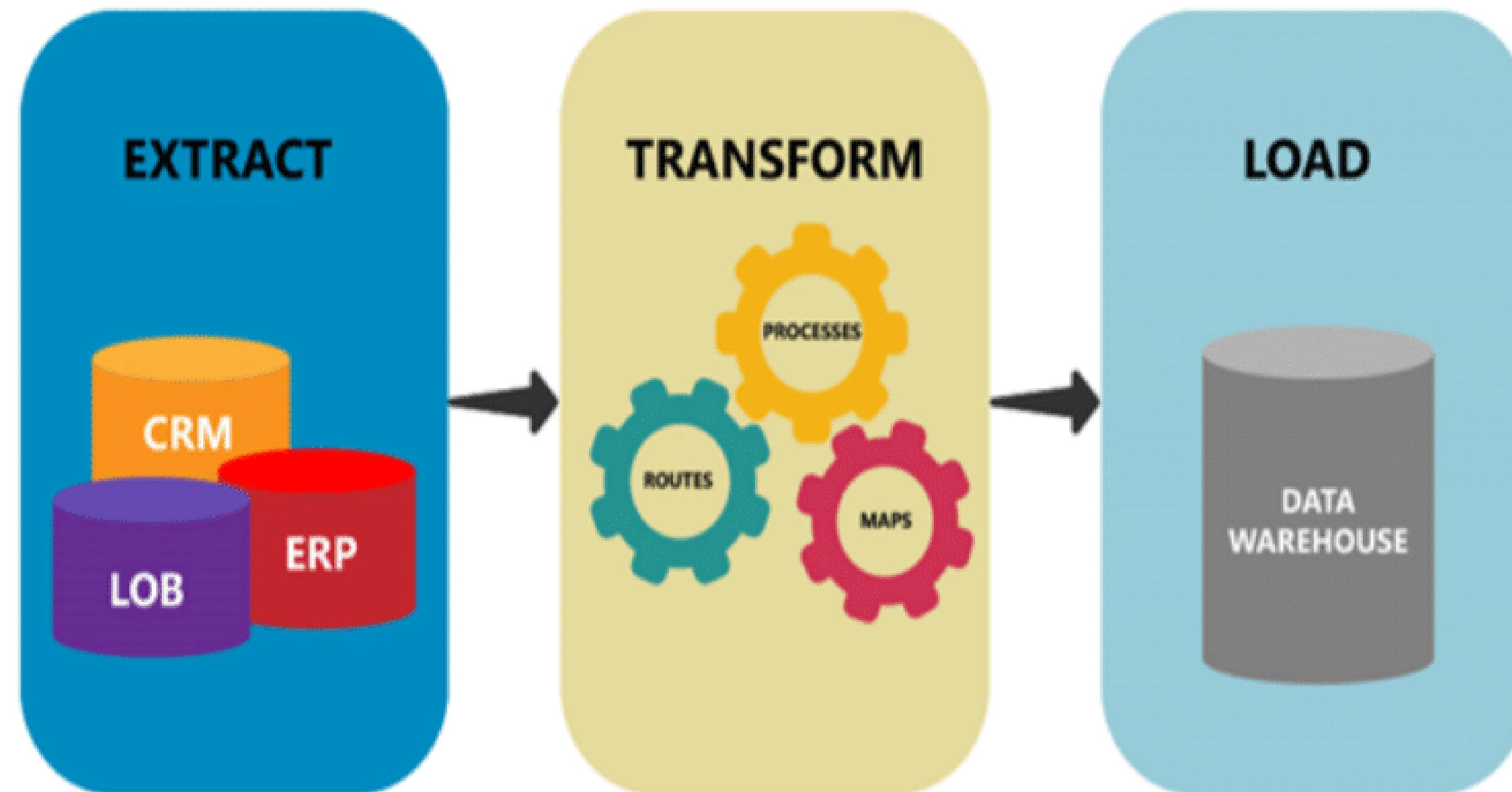
## Apoio do SI nas áreas funcionais

- Uma organização típica tem sistemas a níveis **estratégico, gerencial e operacional** para cada área funcional.





## Vamos aprender a transformar Dados!!!!





**Vamos aprender a transformar Dados!!!!**

## DB Relacional x DB Multidimensional

**DB Relacional:**

Modelo	Cor	Vendas
van	azul	6
van	verde	8
van	branca	9
coupe	azul	12
coupe	verde	15
sedan	verde	20
sedan	branca	13

**DB Multidimensional:**

Modelo	Cor			Totais
	Azul	Verde	Branca	
van	6	8	9	23
coupe	12	15	-	27
sedan	-	20	13	33
Totais	18	43	22	83

Os agrupamentos multidimensionais e as summarizações maximizam o desempenho de acesso aos dados.



## Vamos aprender a transformar Dados!!!!

### DW - Armazenamento

- Precisa armazenar grandes volumes de dados
- Usa *Data Marts*: unidades lógicas menores
  - São pontos de acesso a subconjuntos de dados
  - São construídos para antecipar consultas de um tipo específico de usuário
  - Ex: *Data Mart* financeiro dia-a-dia para gerentes financeiros e um mensal para os diretores e executivos
  - Podem ser constituídos de um ou mais cubos de dados
- Usam o Esquema Estrela (*Star Schema*)
  - Modelagem Multidimensional
    - Tabela de Fatos (*Fact Table*)
    - Cubos dimensionais da tabela de fatos
- O *Star Schema* é popular, mas não é o único

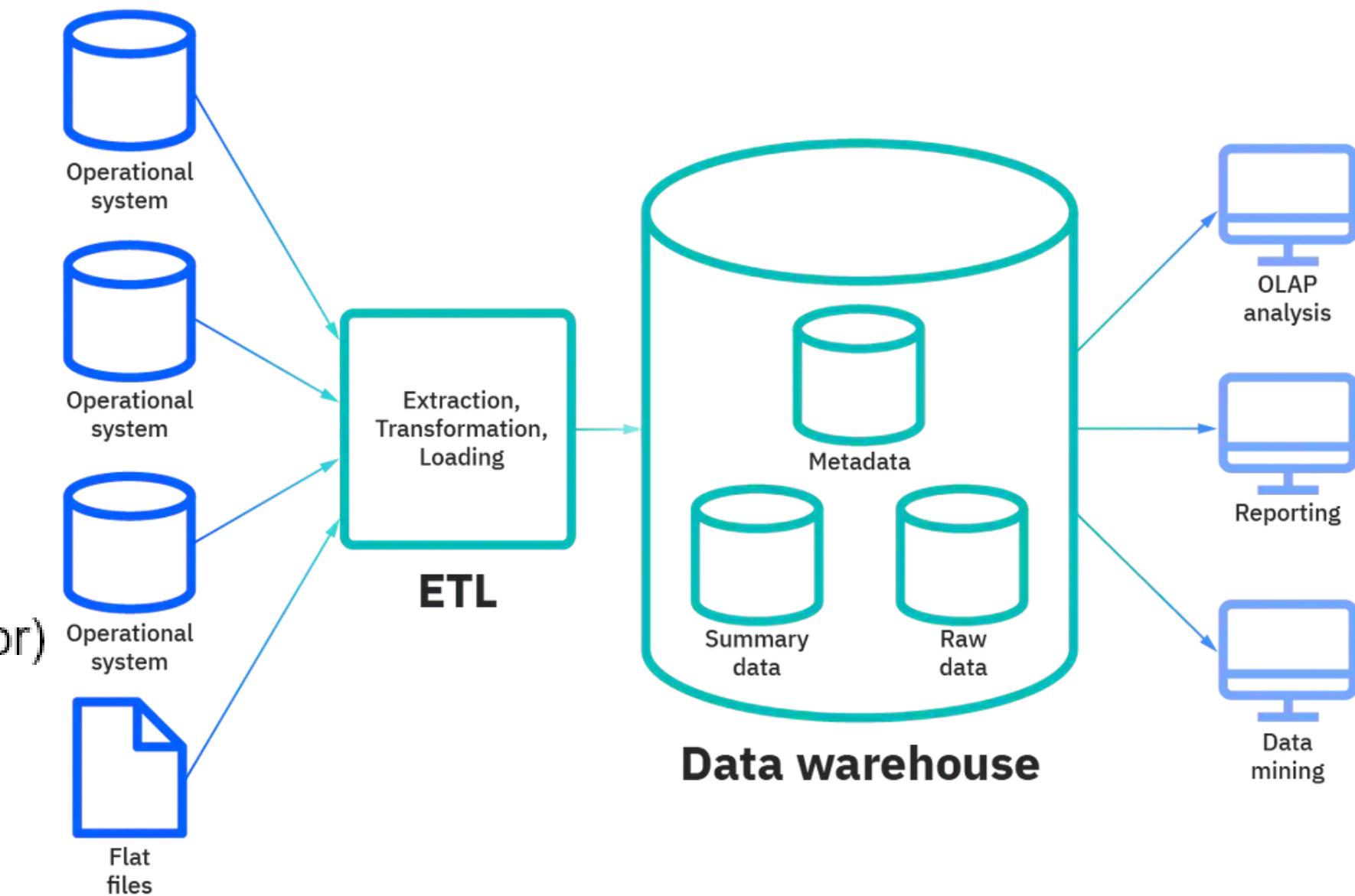




## Vamos aprender a transformar Dados!!!!

# DW - Modelagem

- Em DMBS usamos a normalização para:
  - Evitar redundâncias e garantir consistência
  - Gastar o menor espaço possível
  - Ex: Vendas (CodRev, Grupo, Valor)
  - Revendedoras (CodRev, Nome)
  - Grupos (Grupo, Nome Grupo)
- Em DW privilegiamos a velocidade da consulta
  - A normalização torna-se irrelevante
  - Ex: Vendas (CodRev, Nome, Grupo, Nome Grupo, Valor)
- Vantagens:
  - As consultas ficam muito mais rápidas
  - Os dados ficam mais intuitivos para os usuários
- Desvantagens:
  - Gasta-se muito mais espaço (que ficou barato hoje em dia)





## Vamos aprender a transformar Dados!!!!



ME<sup>®</sup>TDADOS

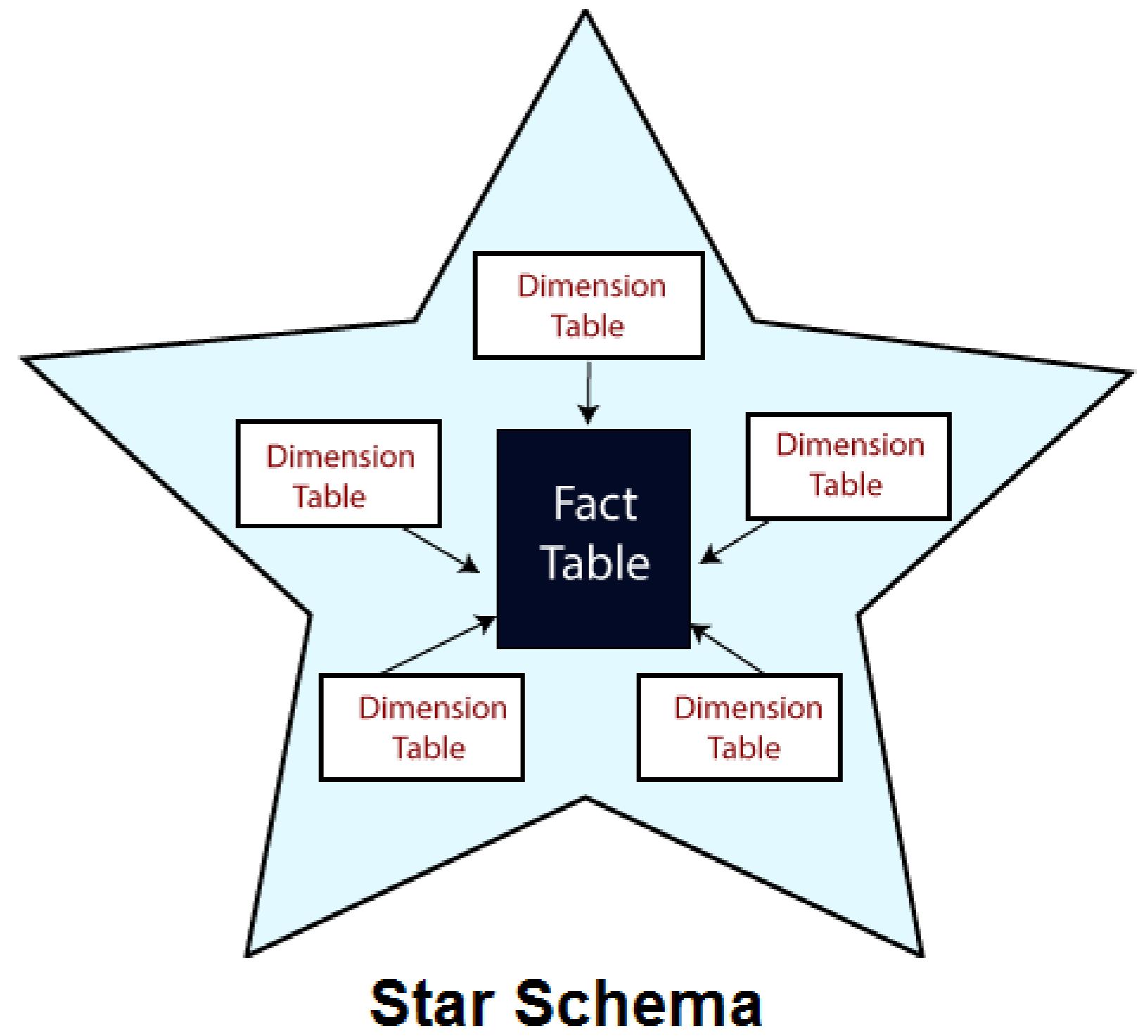
- O DW vai importar dados. Logo, ele precisa saber:
  - Onde buscar qual dado (banco, tabela, atributo)
  - Como transformar o dado original (converter formatos)
  - Como lidar com ausência de dados (valor default)
  - Nome e alias (apelido) (Ex: pCod1 ⇒ Código do Produto)
  - Dentre outras informações
- Solução: Um repositório de Metadados
  - Um “dicionário” contendo “dados sobre os dados”
  - Onde buscar o dado, como transformá-lo, valor default ...
- Isto é crucial para o DW converter dados transacionais em informações de negócio



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## Modelo Estrela





## O que é comunicação síncrona e assíncrona?

### Síncrona

- Mensagens instantâneas;
- Conversa numa sala de *chat*;
- Áudio conferência;
- Videoconferência.

### Assíncrona

- Mensagem de correio eletrónico;
- Participação num fórum;
- Redes sociais (mensagem ou comentários nos murais, etc.).



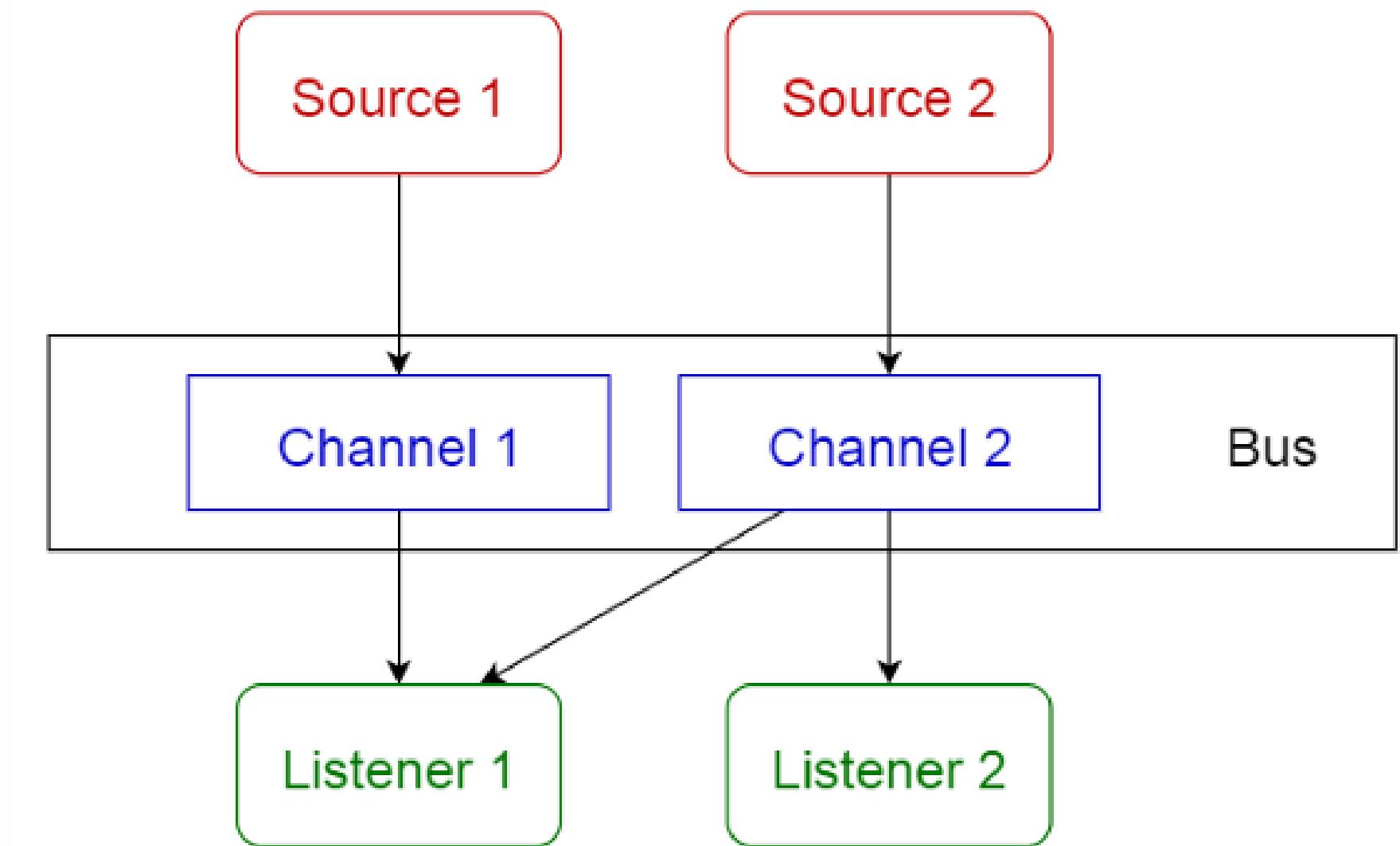


## Padrões de Arquitetura - Event-bus pattern

Esse padrão lida principalmente com eventos e possui 4 componentes principais; fonte de eventos, ouvinte de eventos, canal e barramento de eventos. As origens publicam mensagens para canais específicos em um barramento de eventos. Os ouvintes se inscrevem em canais específicos. Os ouvintes são notificados de mensagens publicadas em um canal no qual se inscreveram anteriormente.

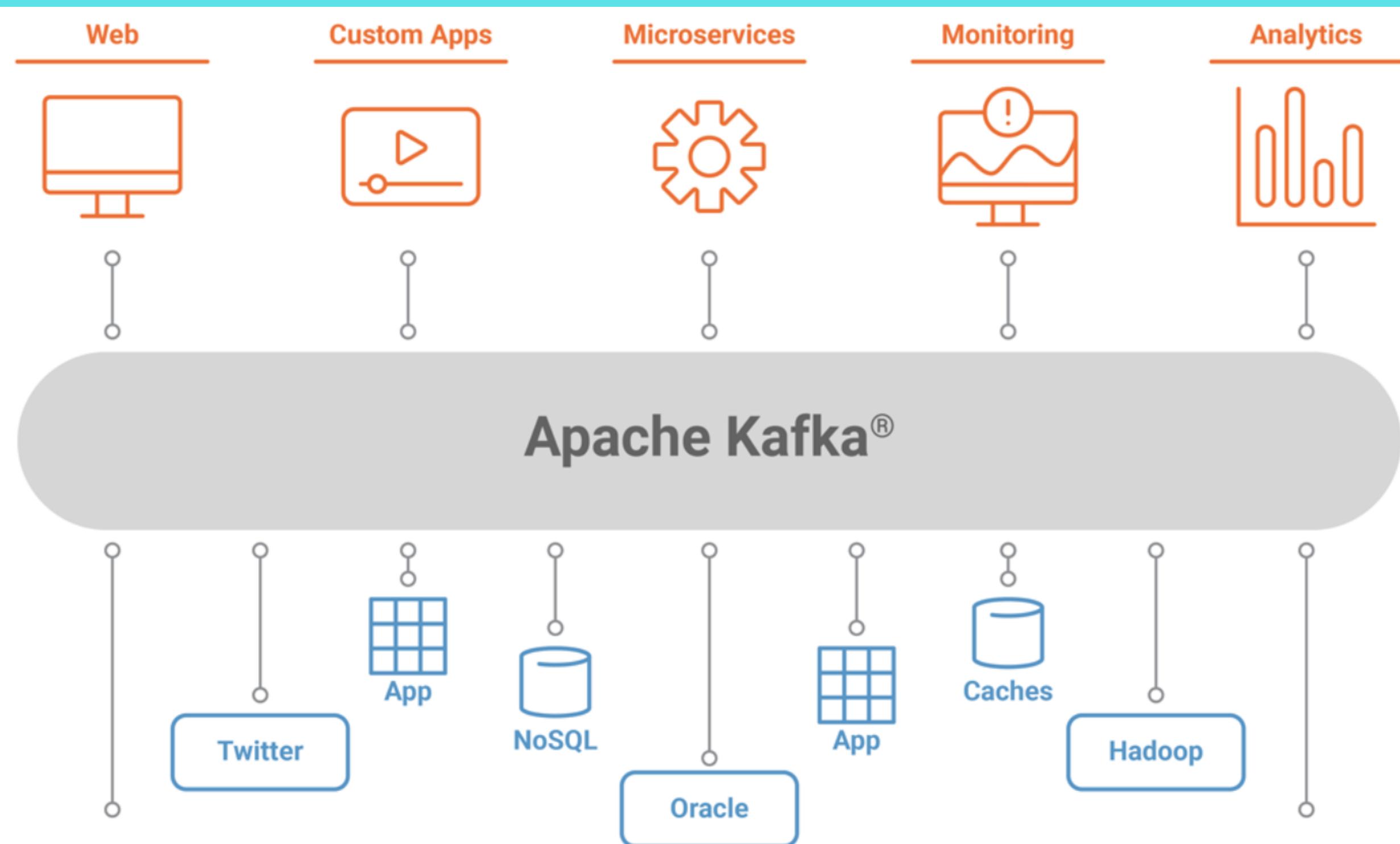
### Usage

- Android development
- Notification services



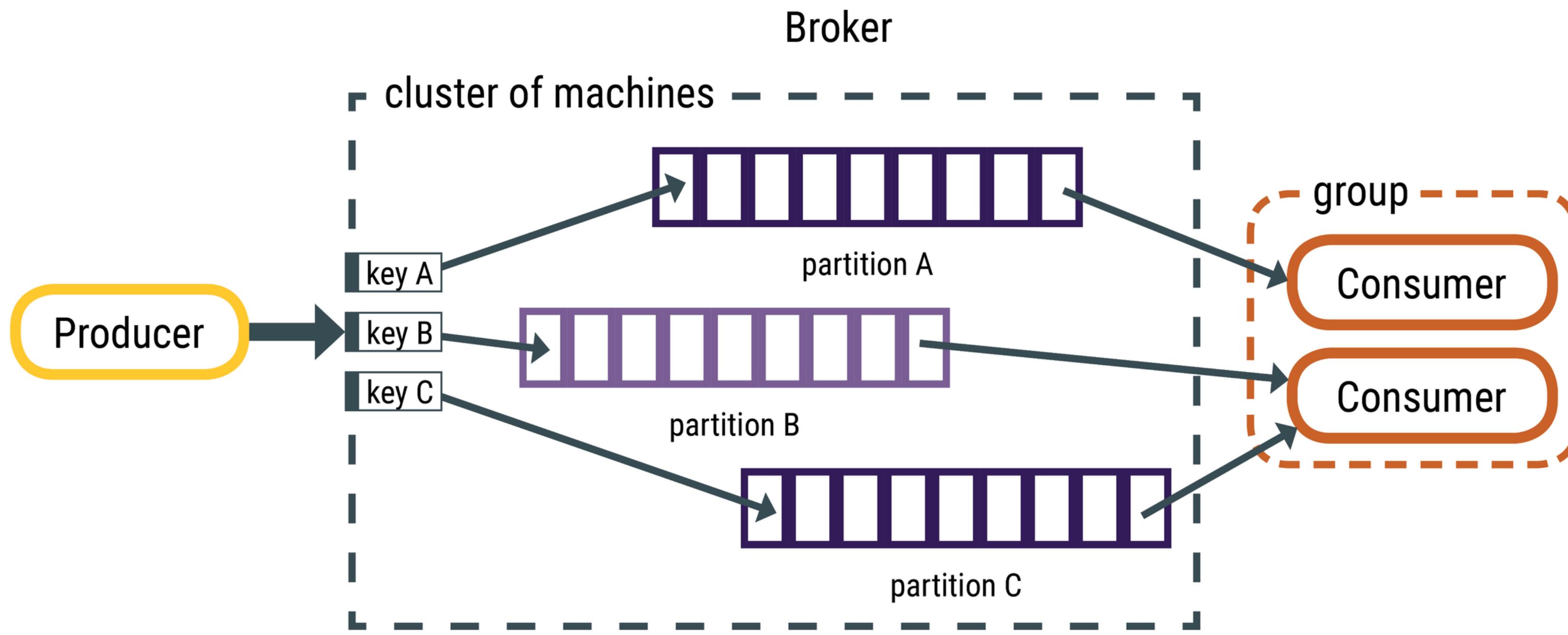


## Apache Kafka



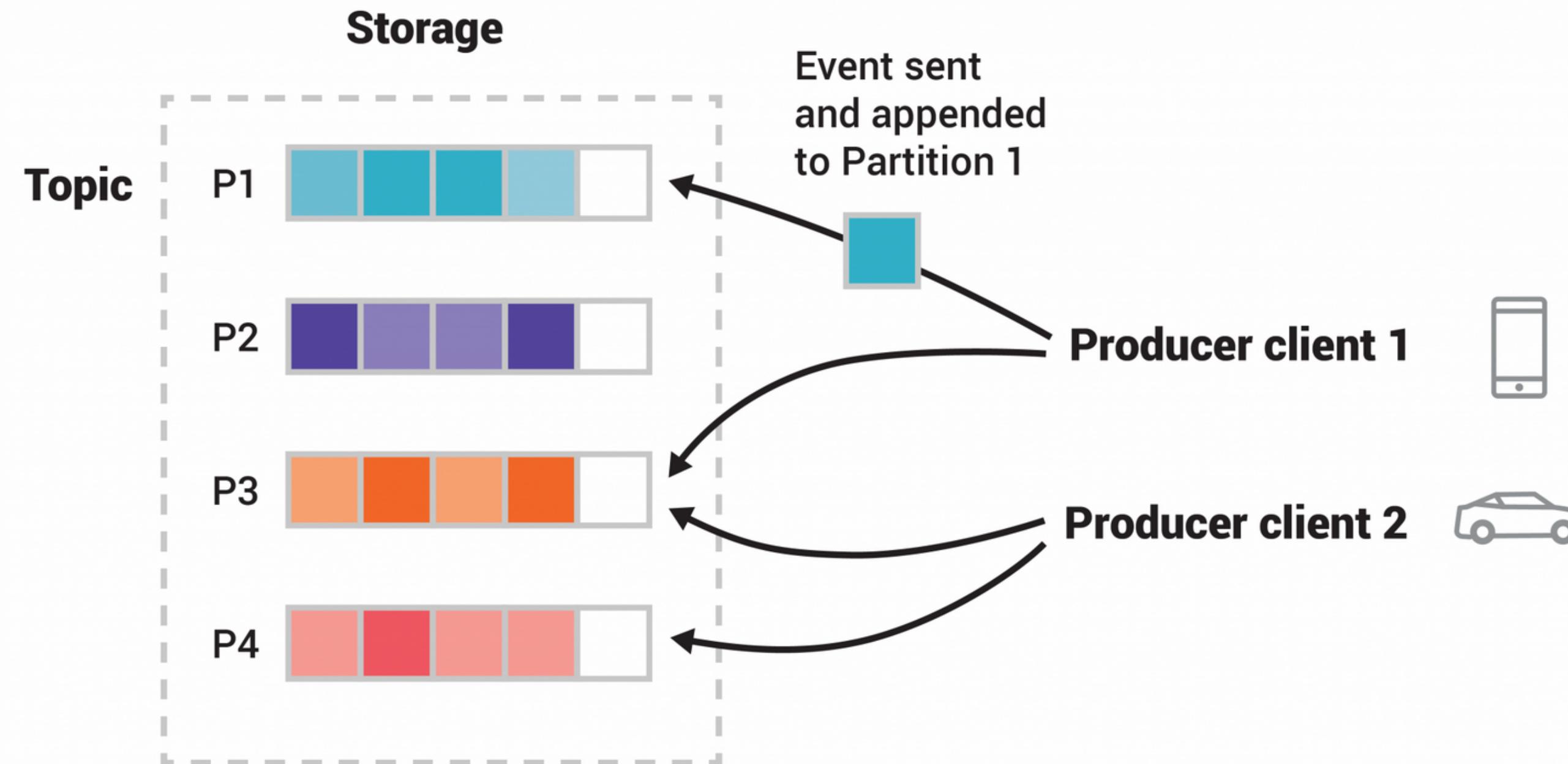


## Apache Kafka





## Apache Kafka

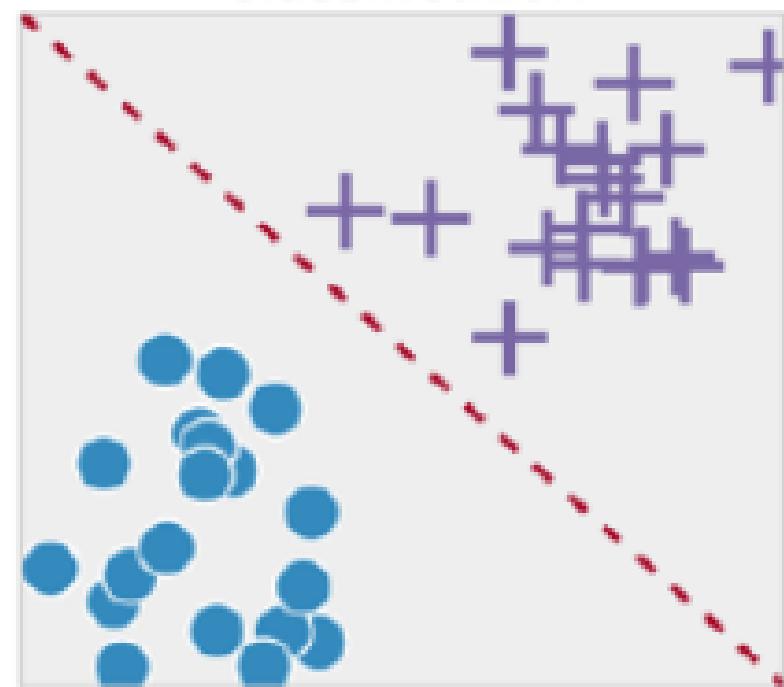


# FORMULAÇÃO DE UM PROBLEMA

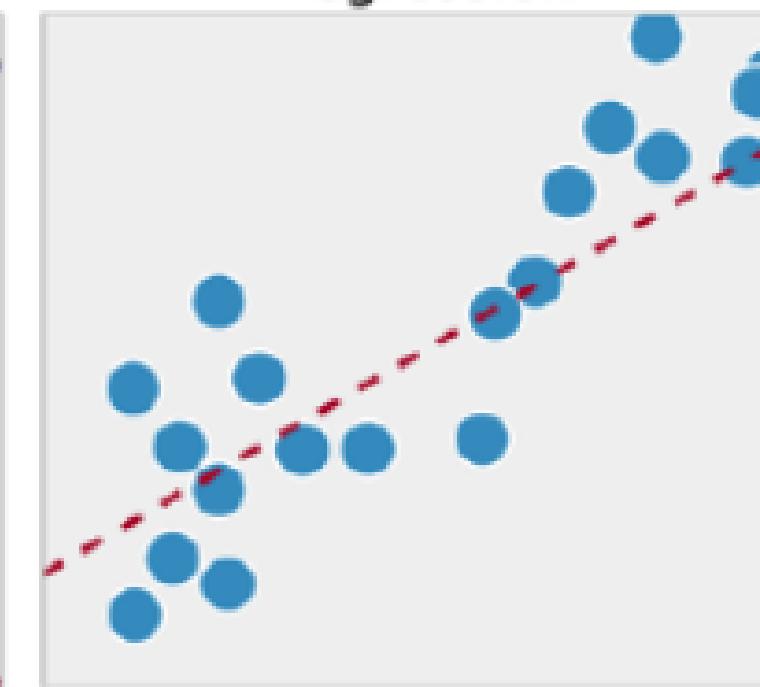
Identificação de uma área de interesse e o tipo de modelo



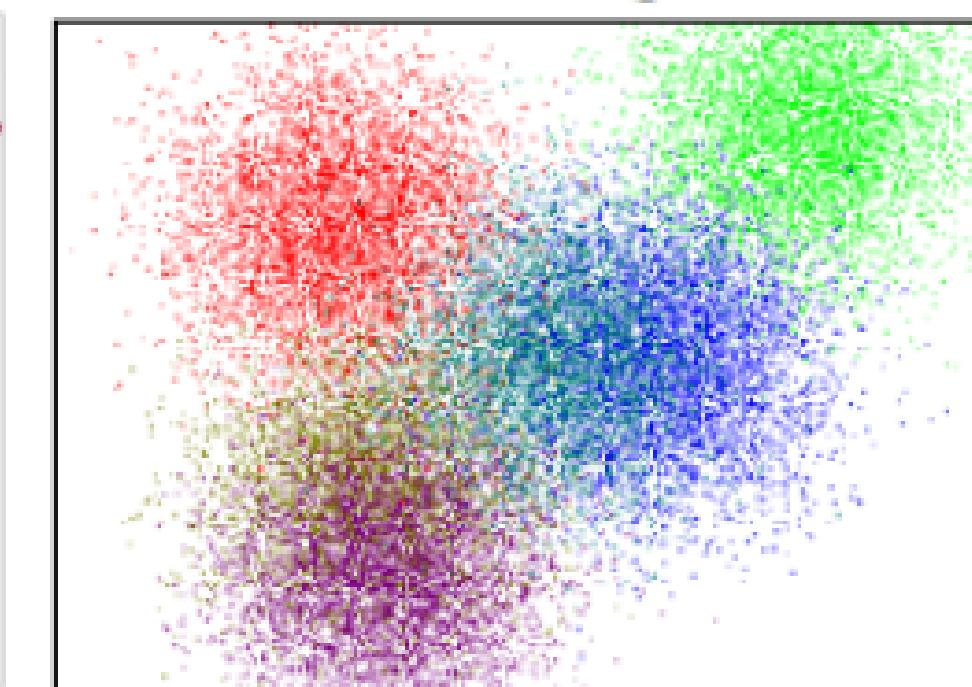
Classification



Regression



Clustering

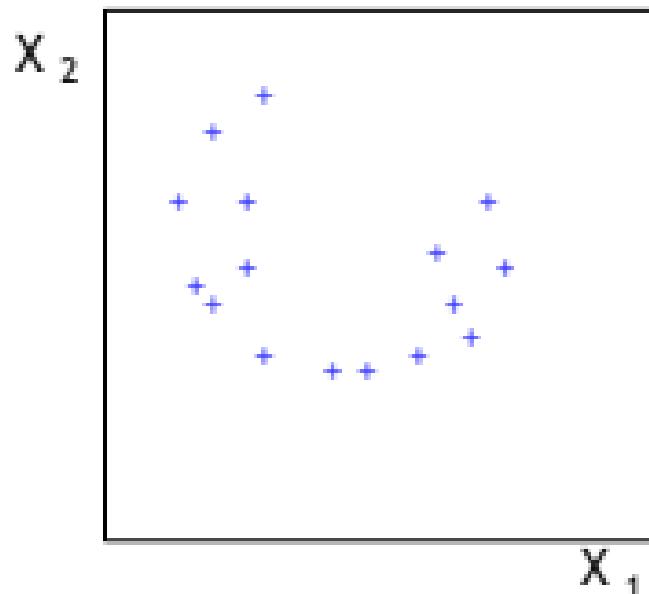


# ESCOLHA DO TIPO DE MODELO A SER APLICADO

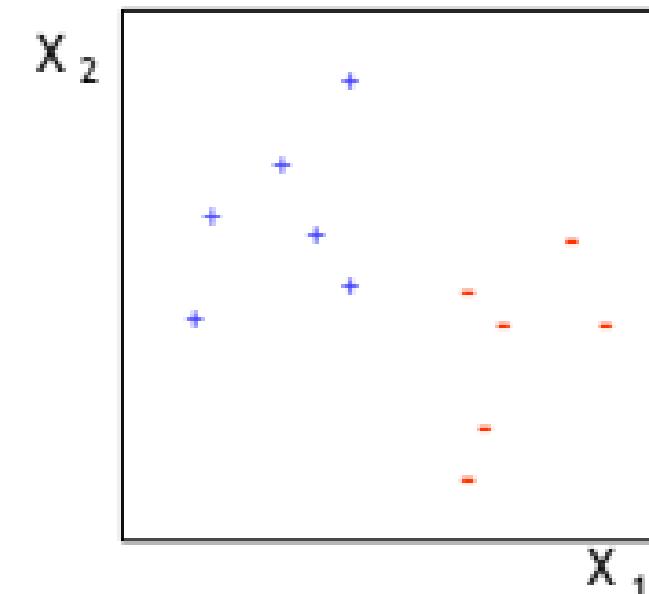
15

## Common Data Mining tasks

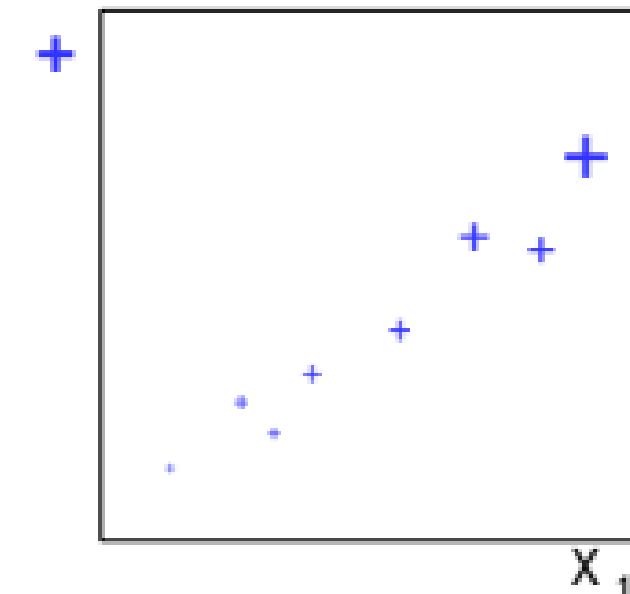
Clustering



Classificação



Regressão



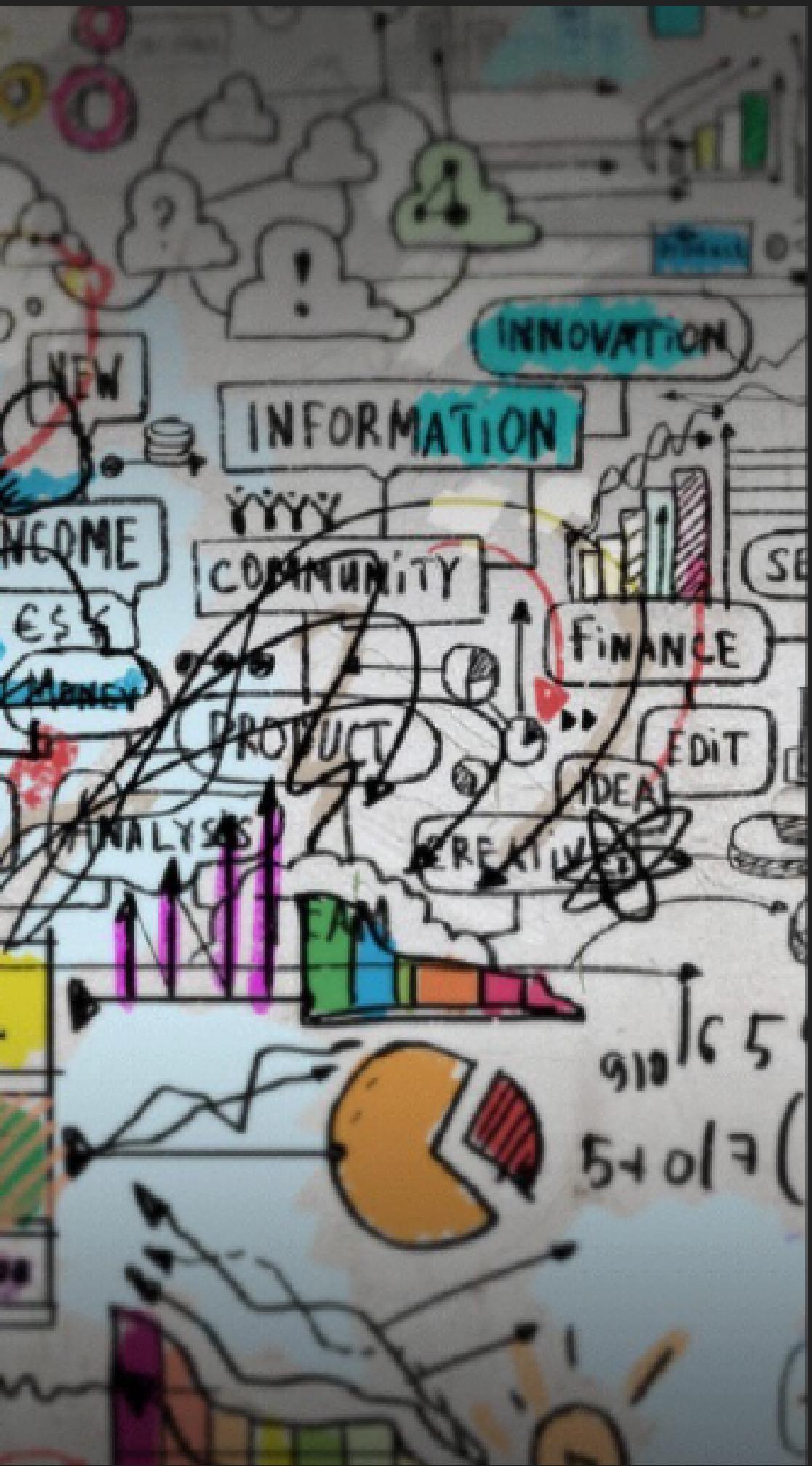
- k-th Nearest Neighbour
- Parzen Window
- Unfolding, Conjoint Analysis, Cat-PCA

- Linear Discriminant Analysis, QDA
- Logistic Regression (Logit)
- Decision Trees, LSSVM, NN, VS

- Classical Linear Regression
- Ridge Regression
- NN, CART

# TIPOS DE MODELOS

- REGRESSÃO
- CLASSIFICAÇÃO
- AGRUPAMENTO



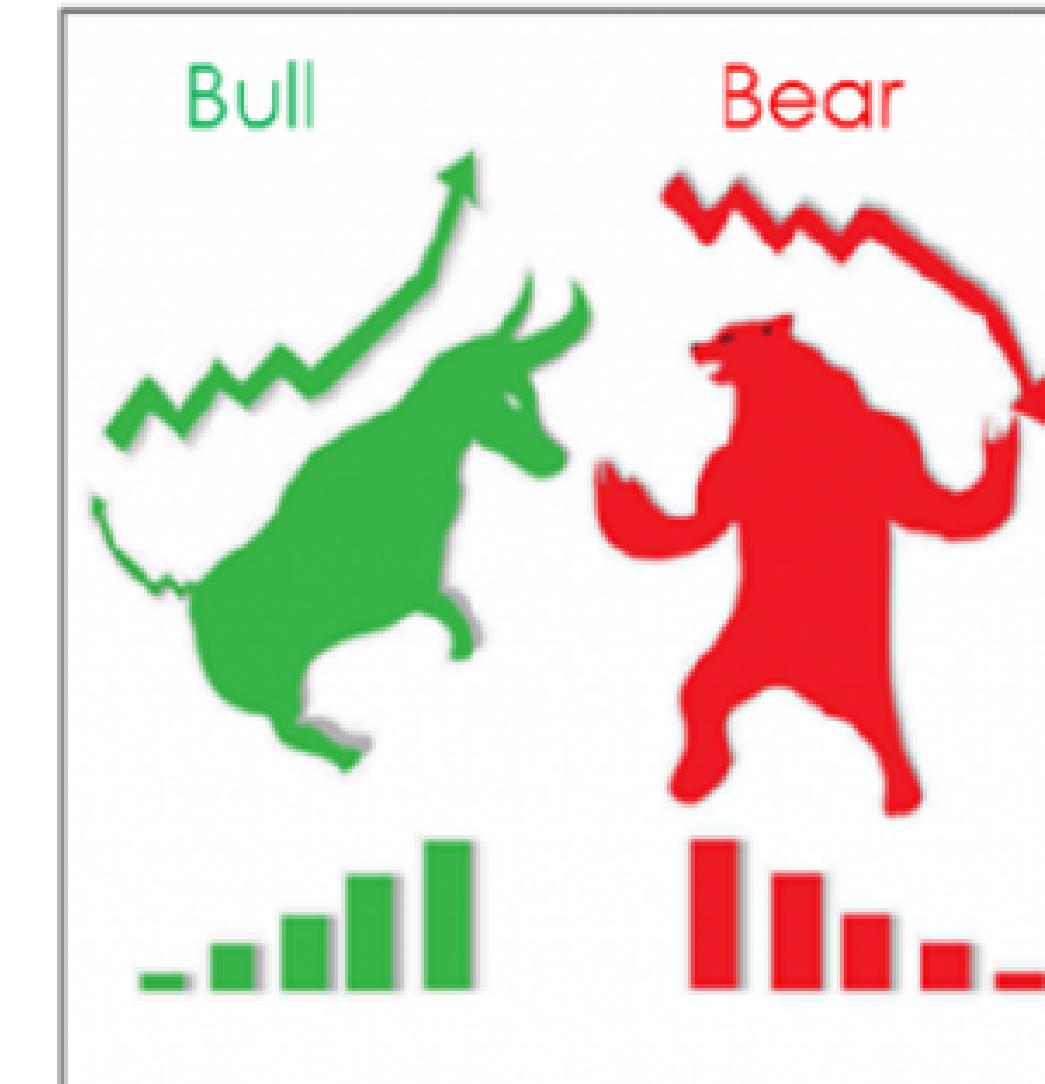
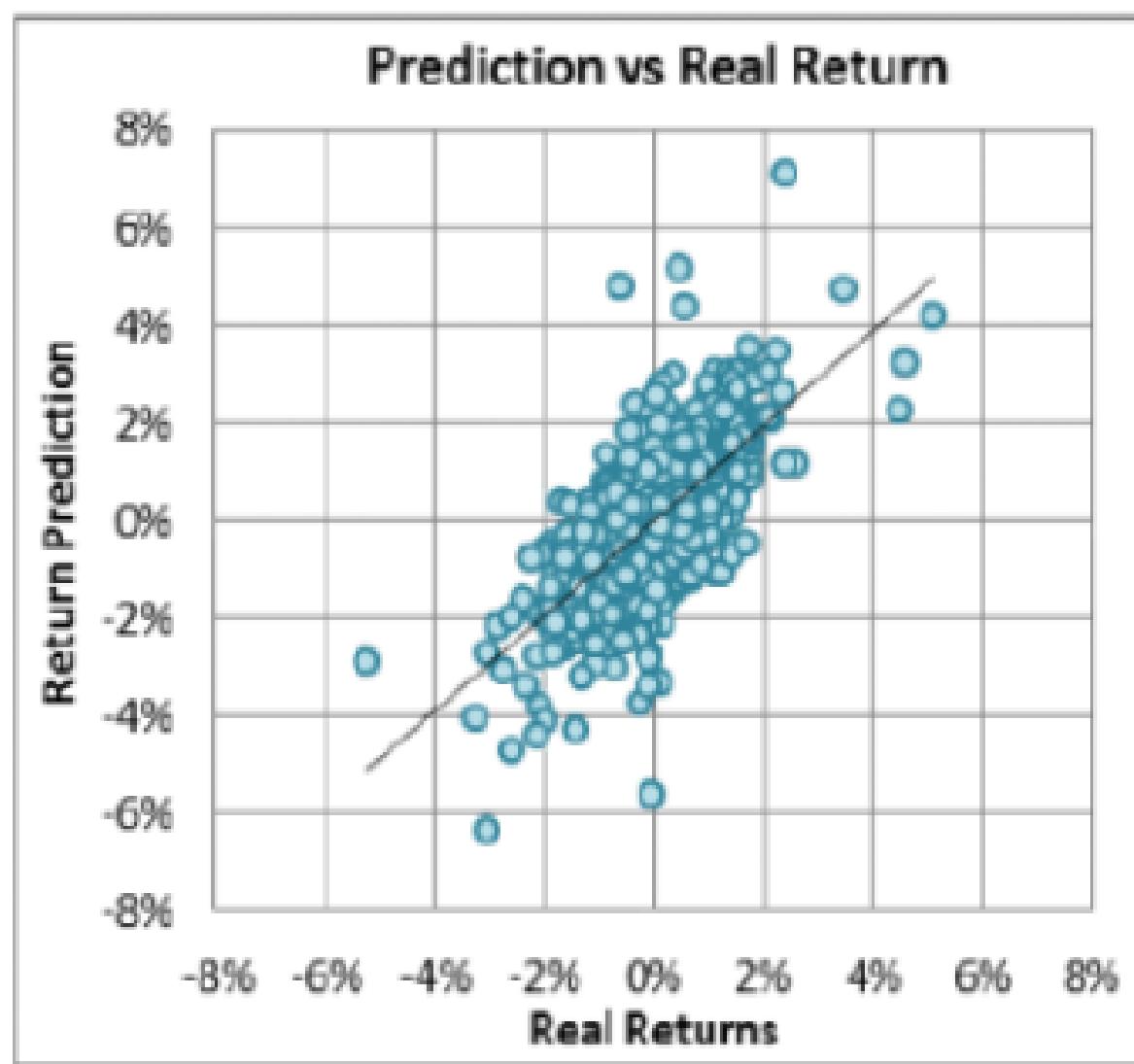


## Regressão vs Classificação

Regression

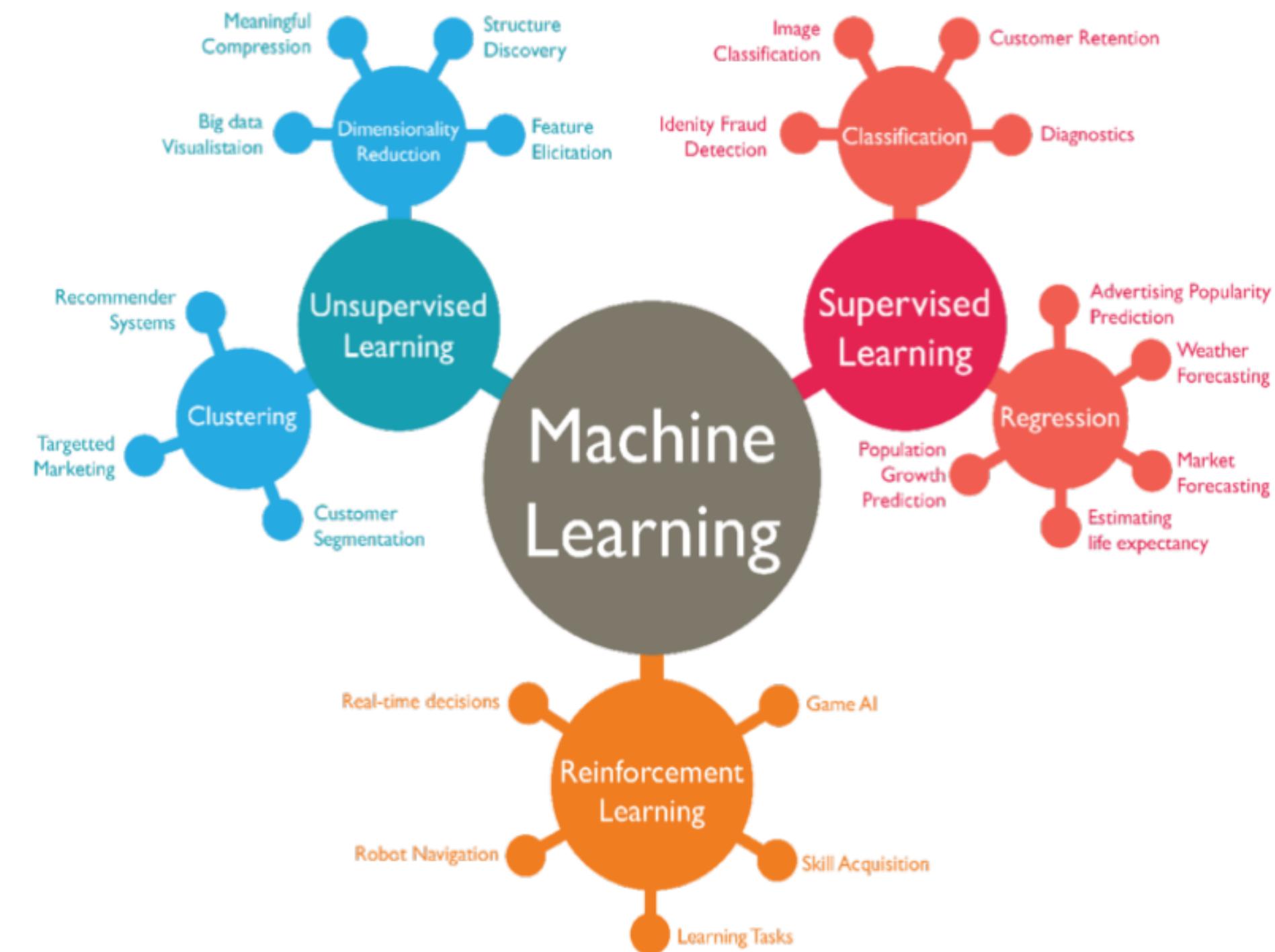
vs

Classification



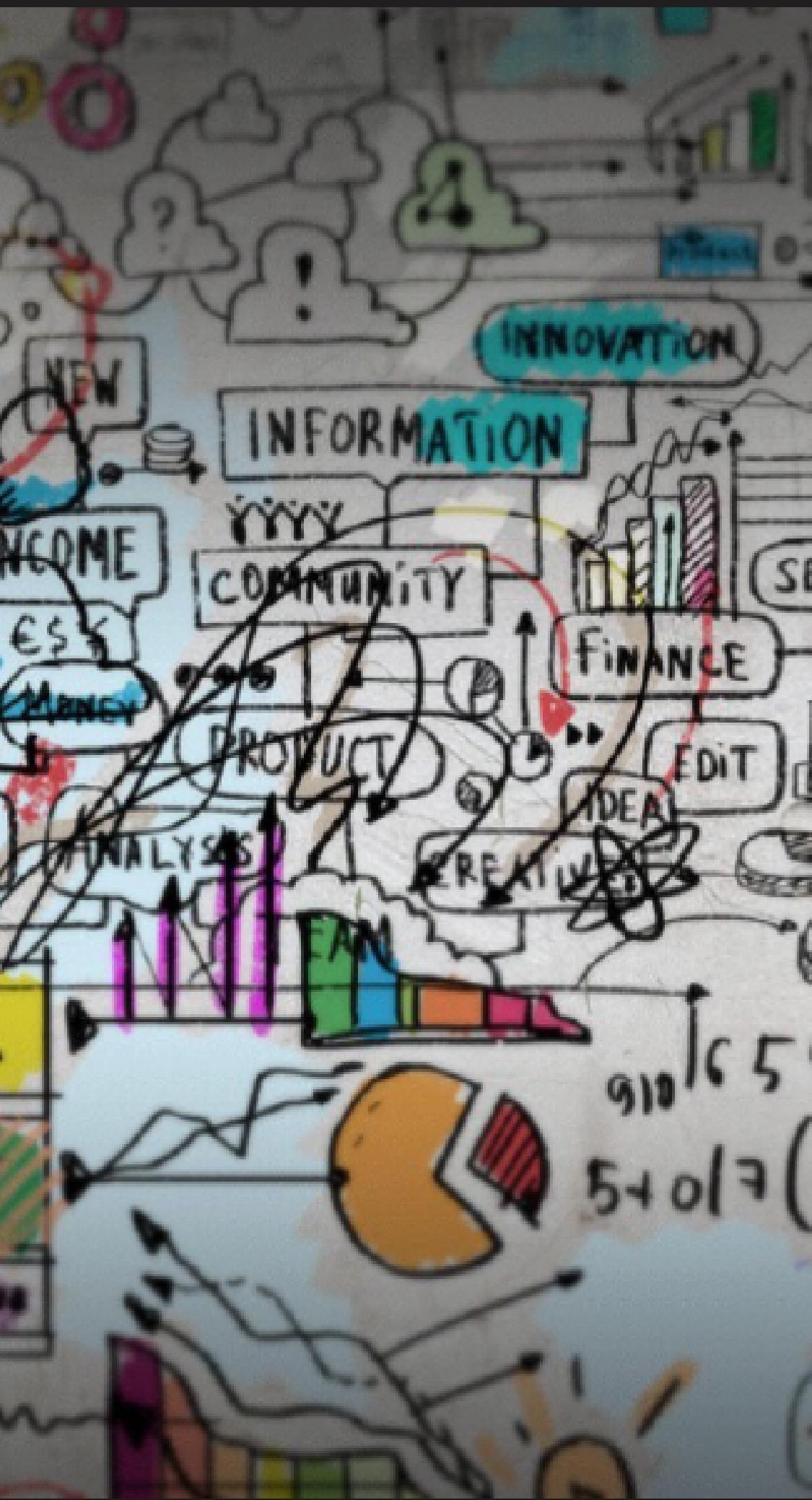


# Aprendizado de Máquina



# O QUE É REGRESSÃO

## ?





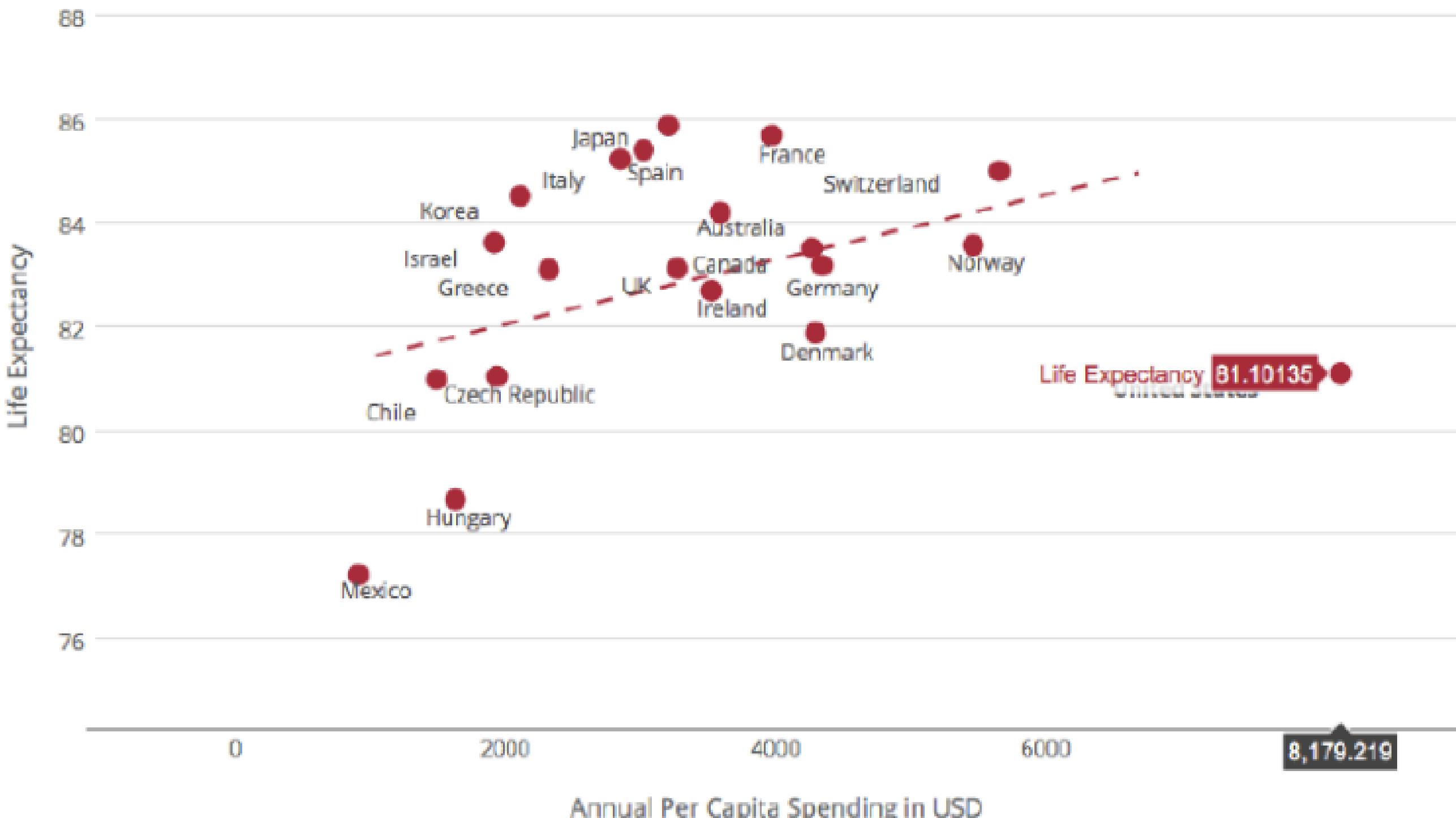
## Regressão

# DESMISTIFICANDO A CIÊNCIA DE DADOS

## REGRESSÃO

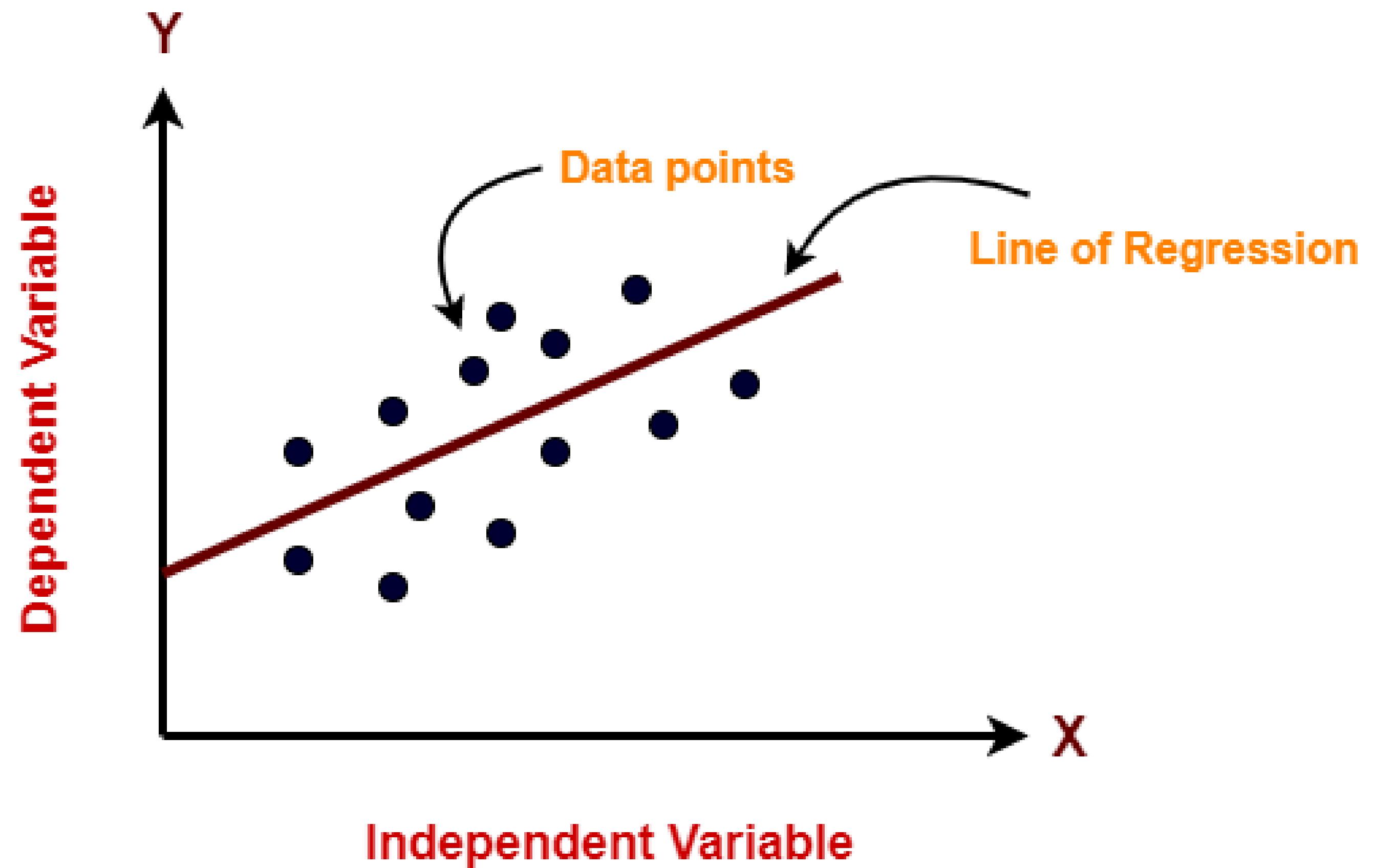
<https://plot.ly>

```
('Coefficients: \n', array([ 0.00118801]))  
Mean squared error: 9.71  
Variance score: -2.38
```





## Regressão



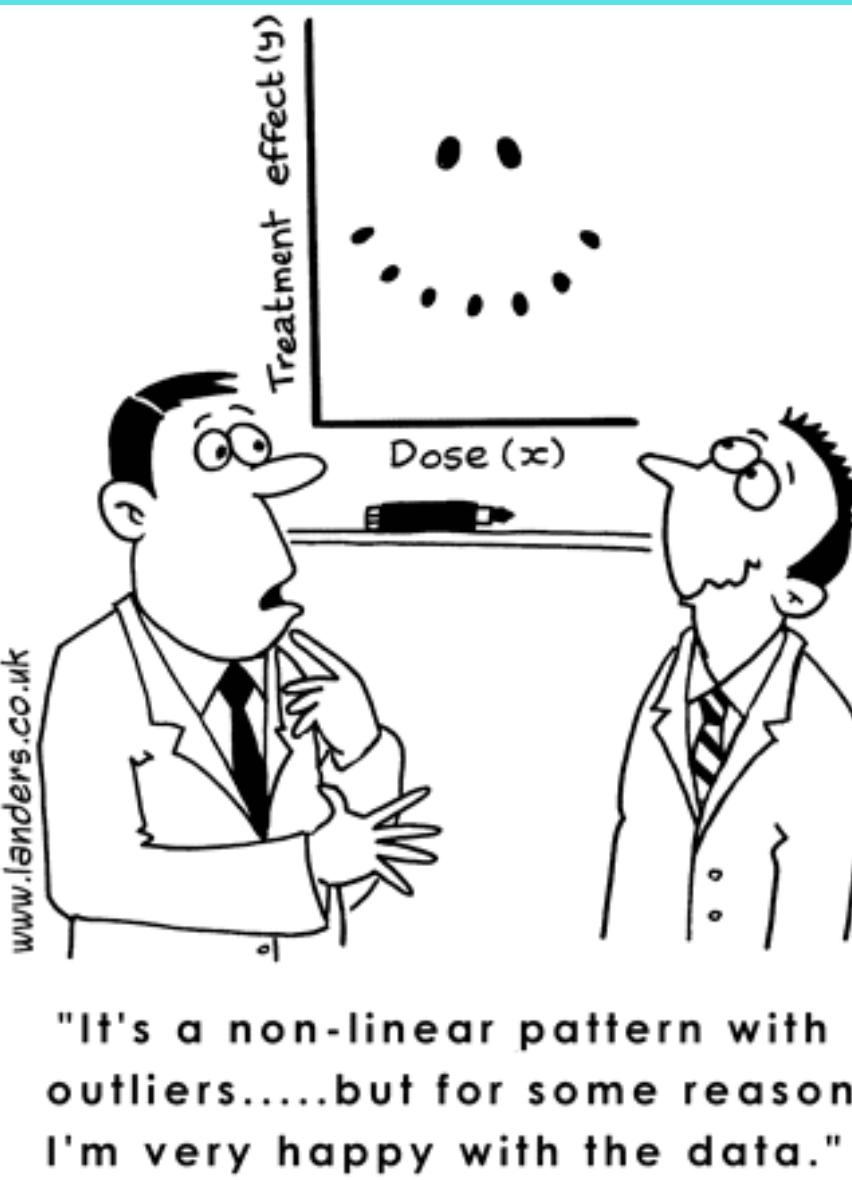


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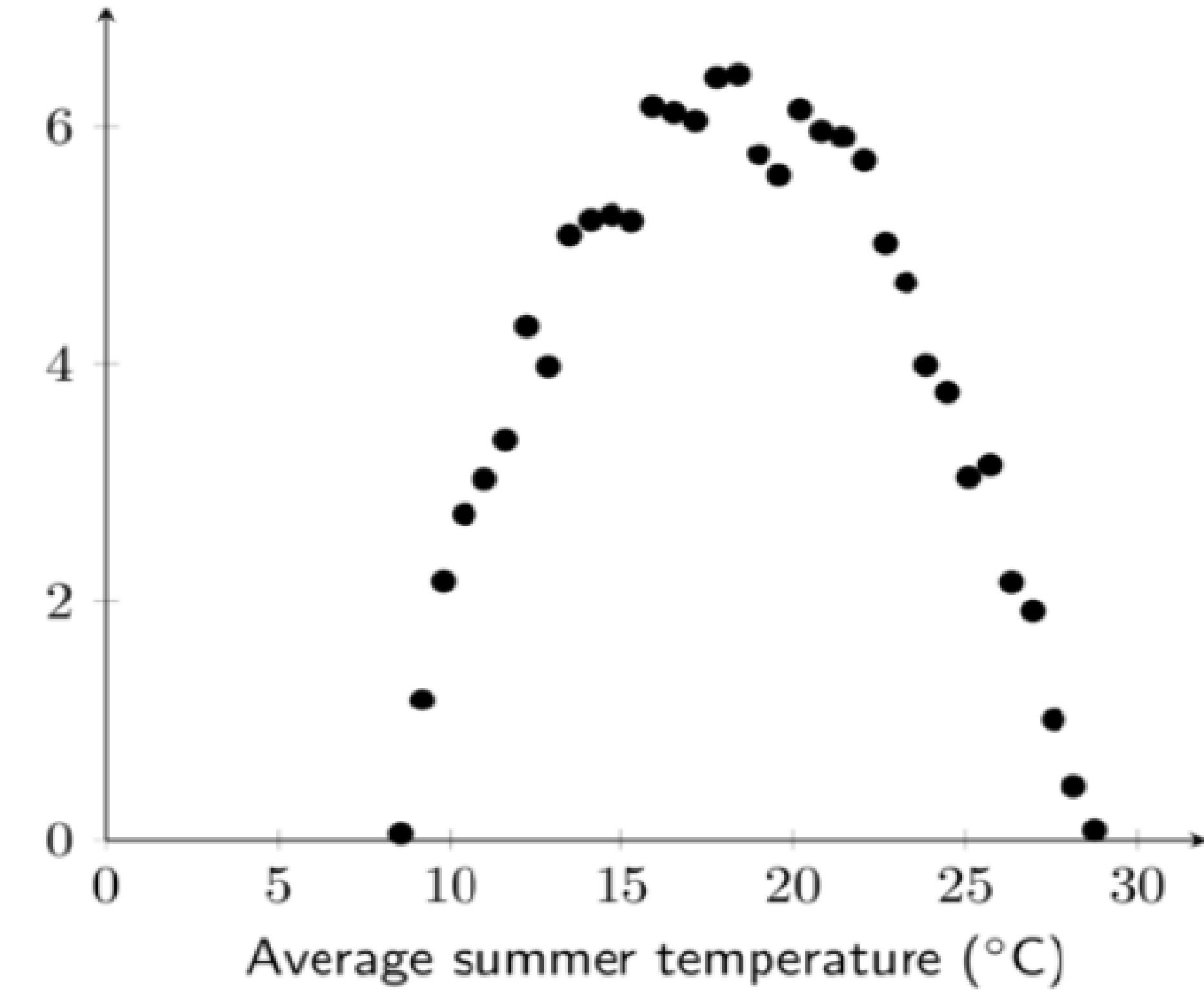


# REGRESSÃO

## Regressão

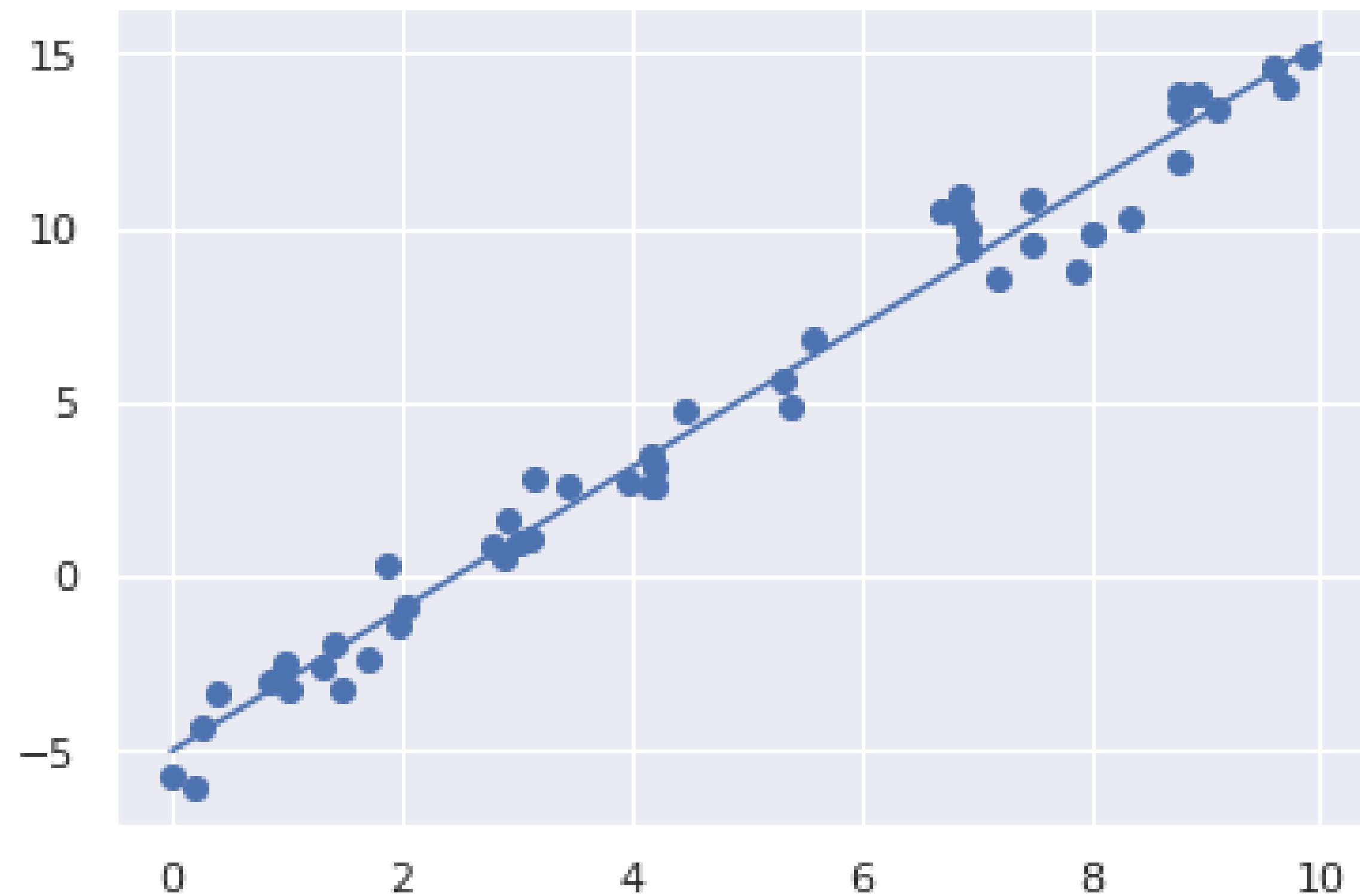


Crop yield (tonnes per hectare)





## Regressão

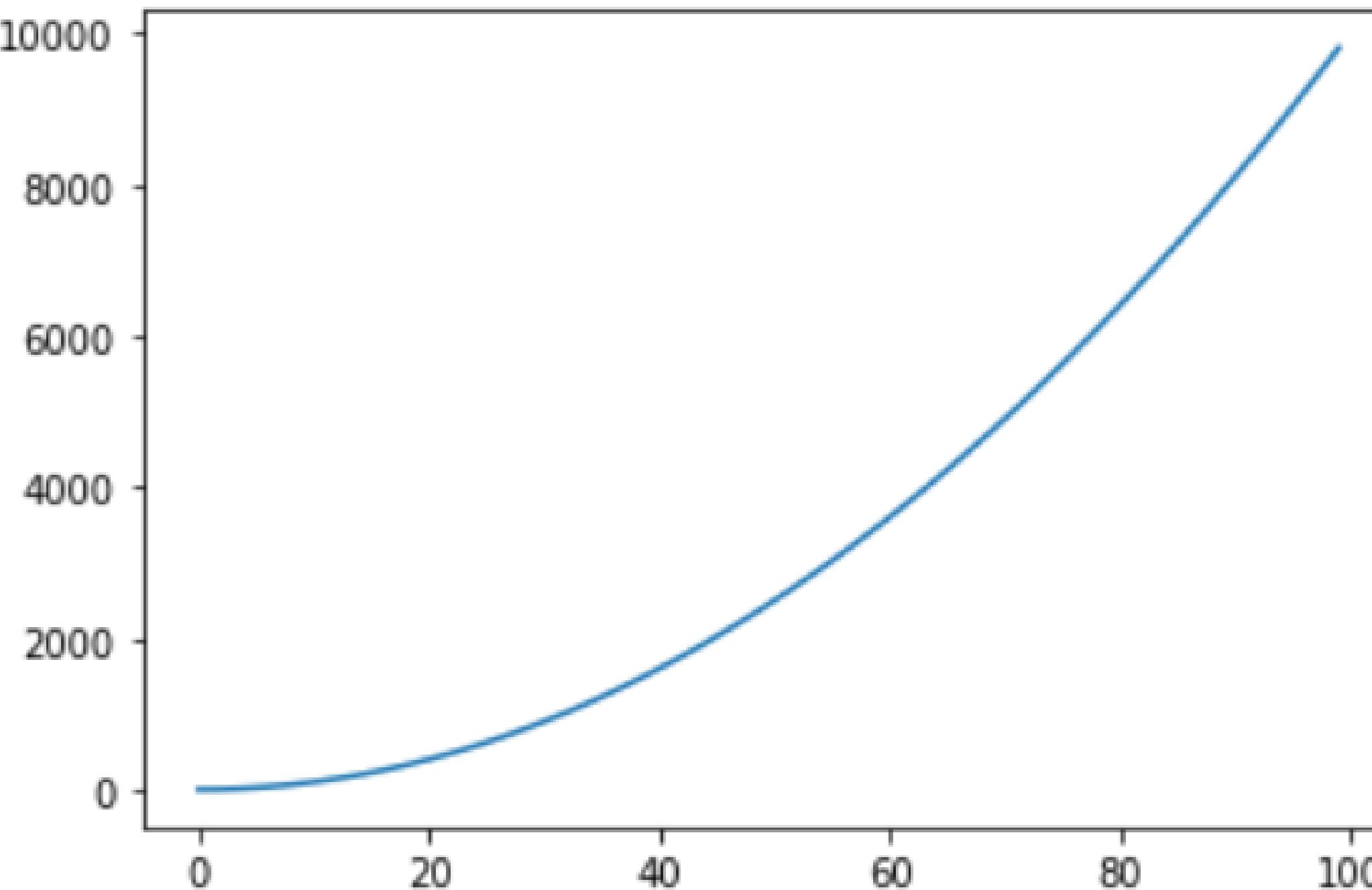


<https://colab.research.google.com/drive/1nRMsQw5yKCgBL8wgAZEt9ZKnMQI6l1R8?usp=sharing>



## Regressão

[<matplotlib.lines.Line2D at 0x7f92e07d3d10>]



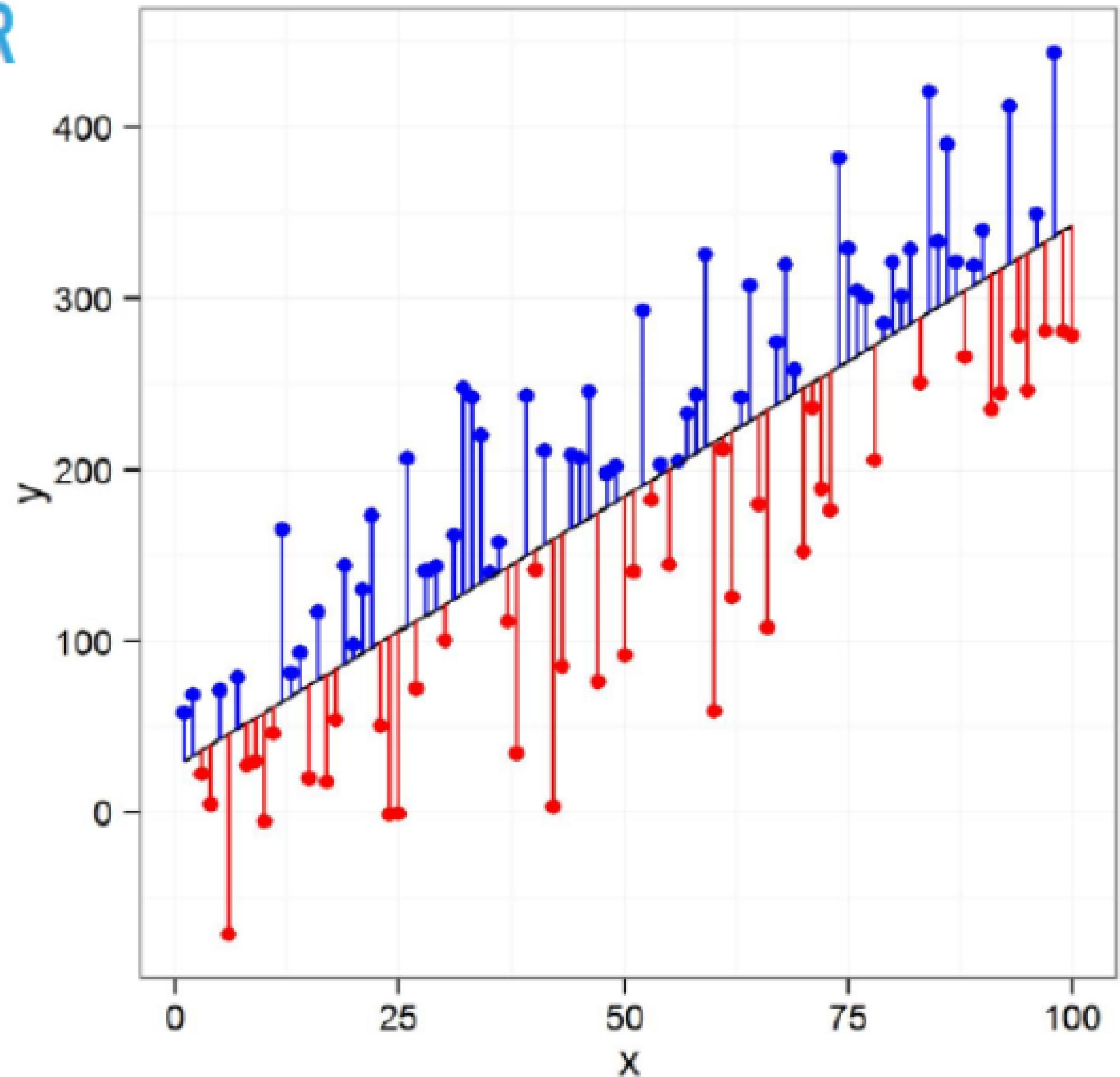


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## Regressão

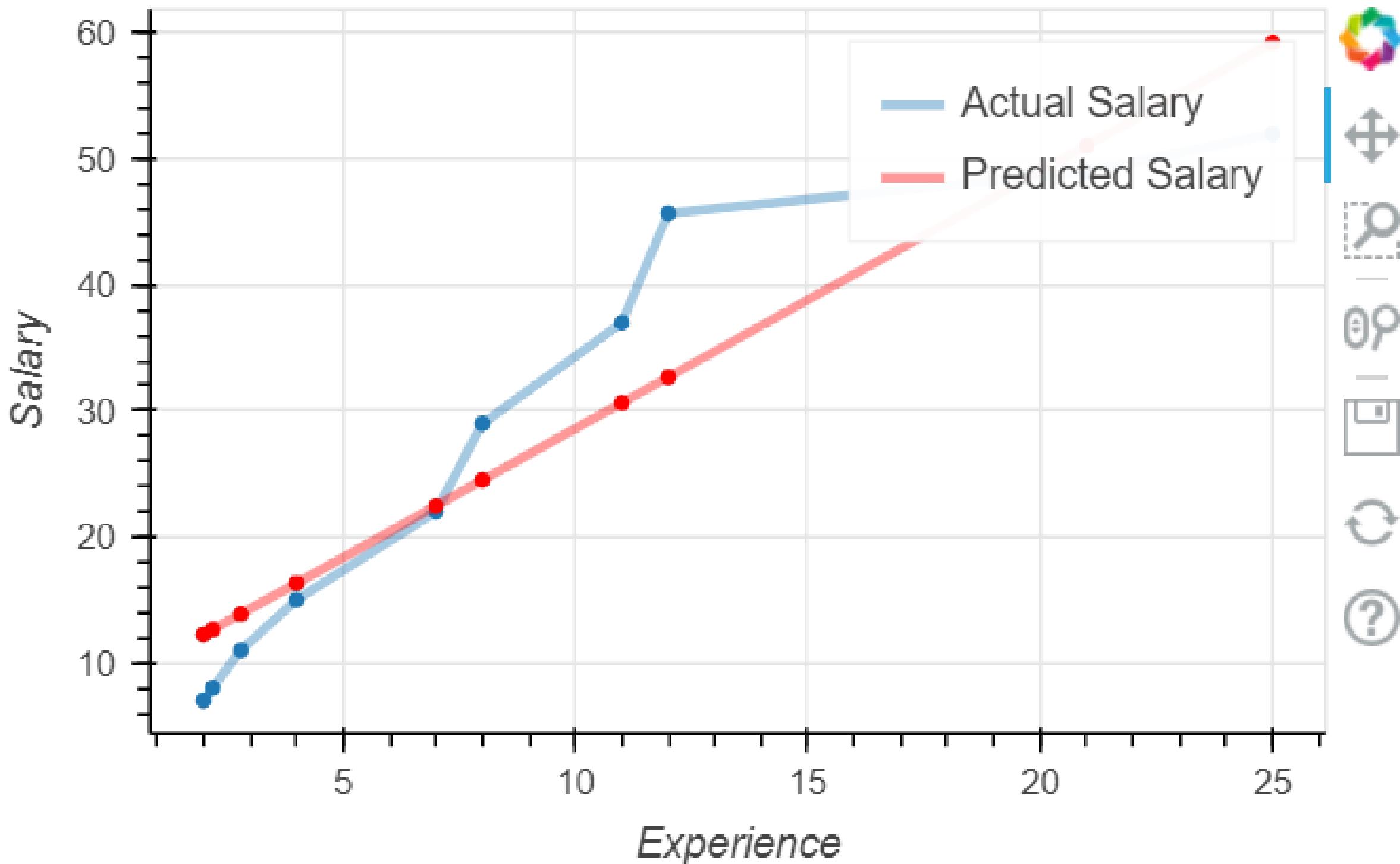
# REGRESSION ERROR





## Regressão

### Actual vs Predicted Salary



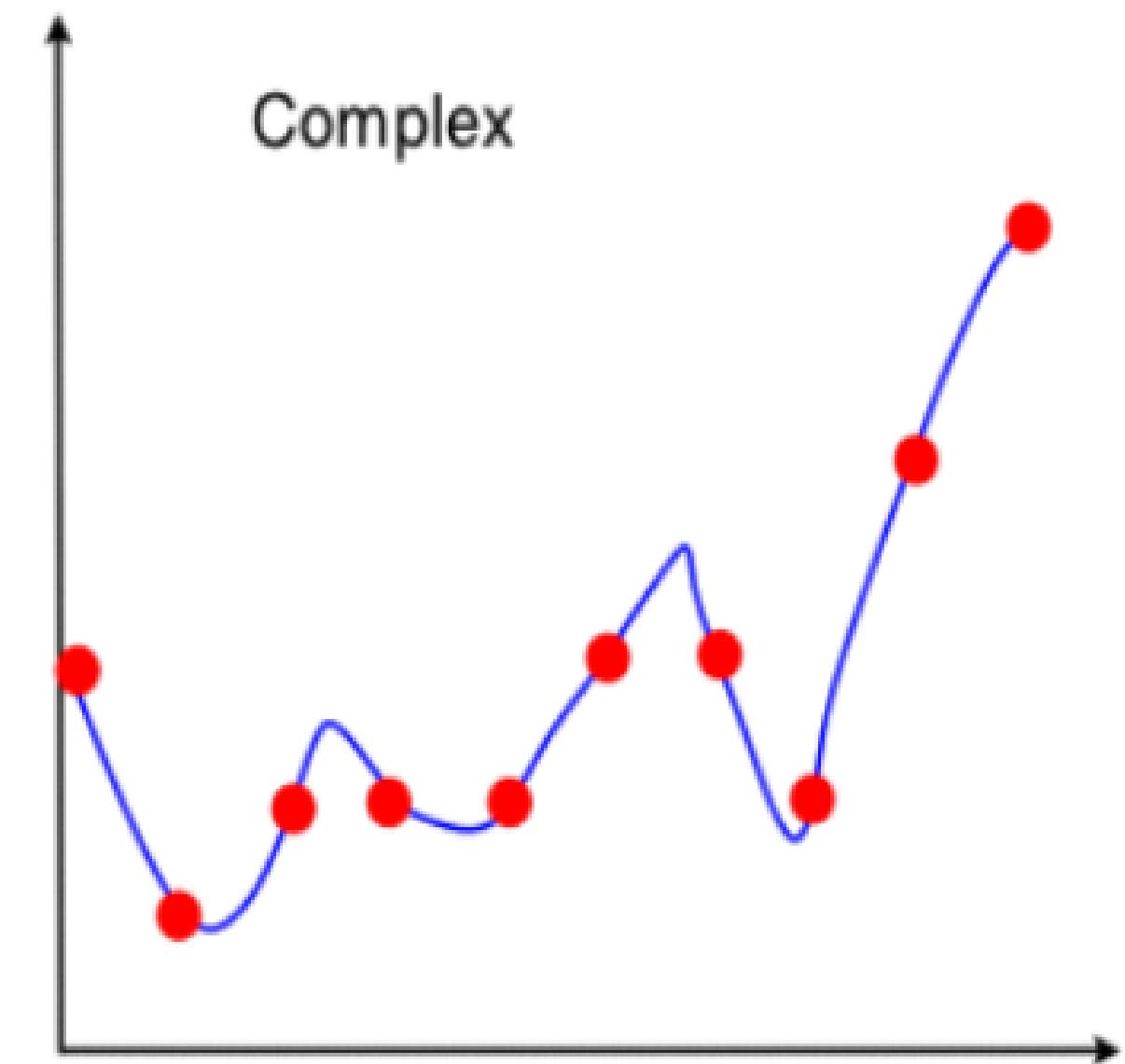
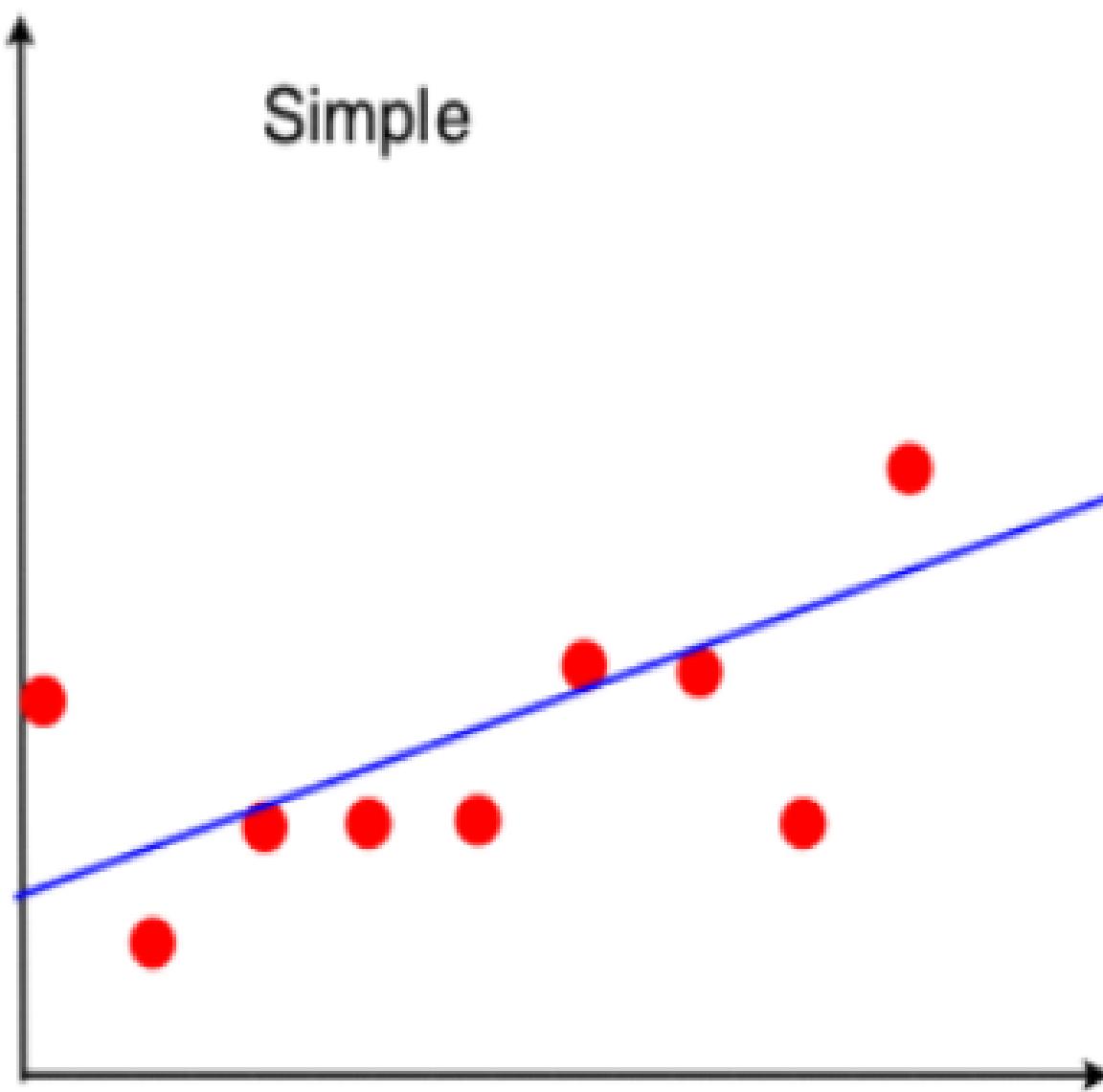
[olab.research.google.com/drive/1elK5Xy6lqKZhv5K7YC6FTYUCp9e0\\_R9O?usp=sharing](https://olab.research.google.com/drive/1elK5Xy6lqKZhv5K7YC6FTYUCp9e0_R9O?usp=sharing)



## Regressão

DESMISTIFICANDO A CIÊNCIA DE DADOS

# QUAL A MELHOR PREDIÇÃO





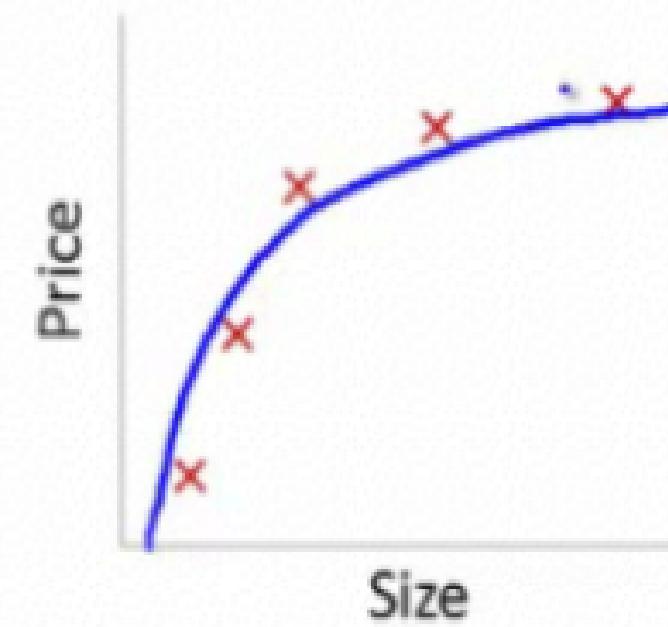
## Regressão

## BIAS E OVERFITTING



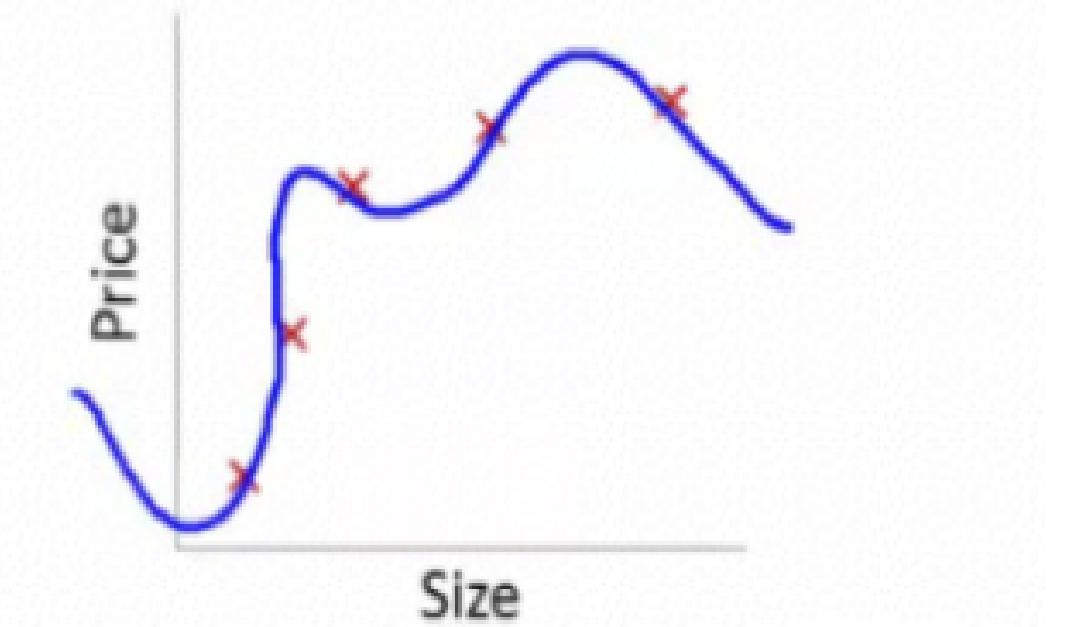
$$\theta_0 + \theta_1 x$$

High bias  
(underfit)



$$\theta_0 + \theta_1 x + \theta_2 x^2$$

"Just right"



$$\theta_0 + \theta_1 x + \theta_2 x^2 + \theta_3 x^3 + \theta_4 x^4$$

High variance  
(overfit)



## Regressão

### OCCAM'S RAZOR

- *Se os resultados forem semelhantes escolha a solução mais simples.*
- *Em Data Science prefira sempre o modelo mais simples*



14th-century English logician William of Ockham



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## Regressão



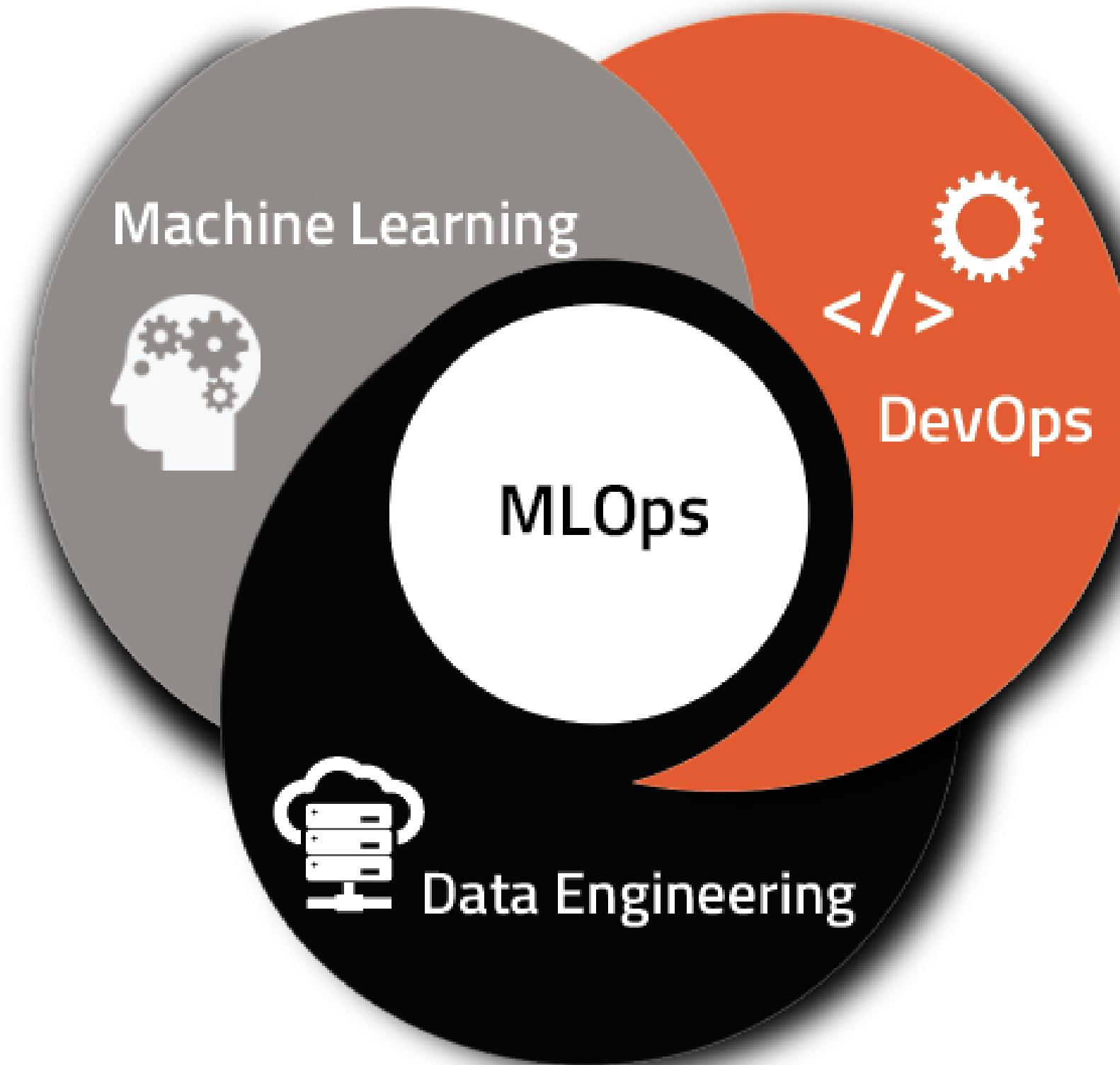
<https://www.kaggle.com/code/naubergois/boston-housing>



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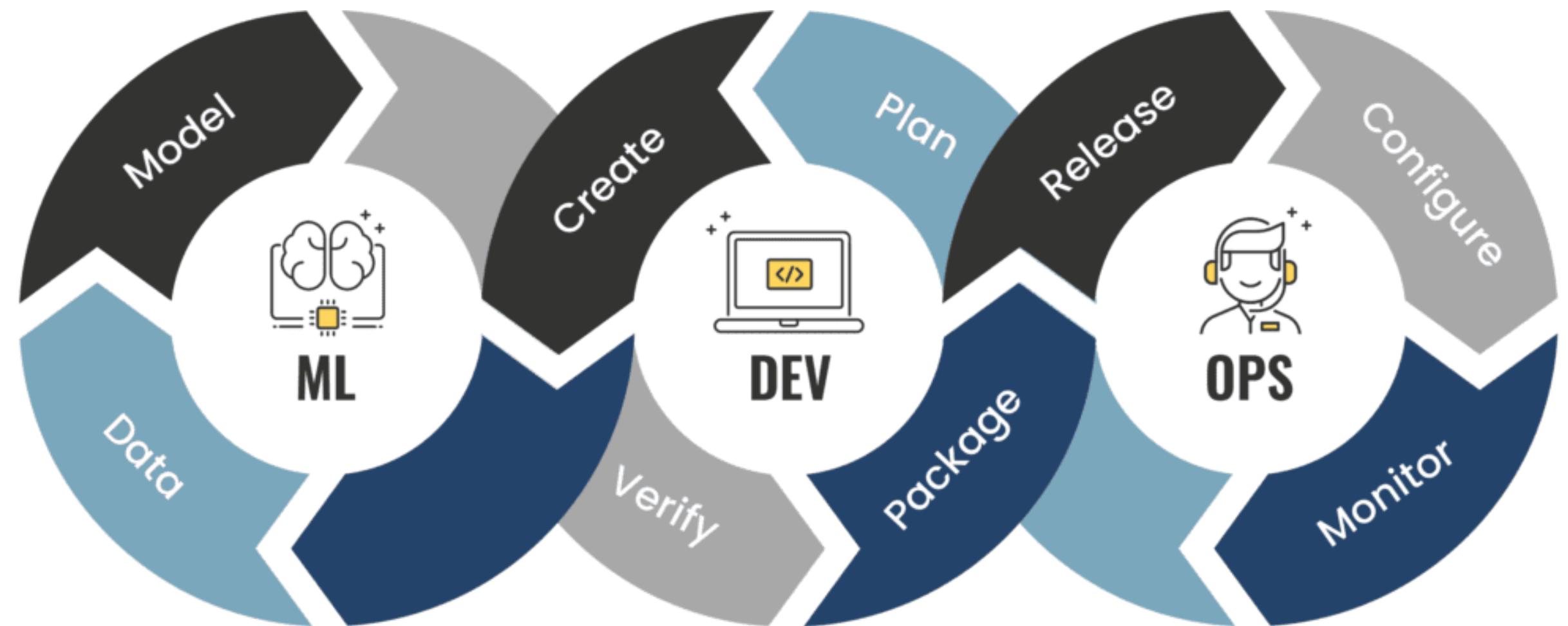
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## MLOPS

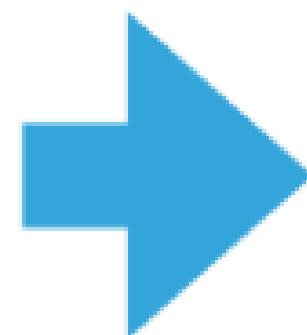




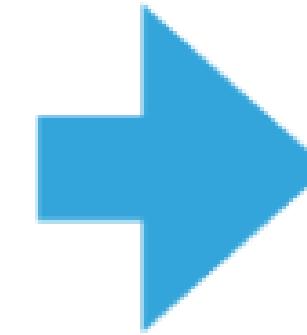
## MLOPS



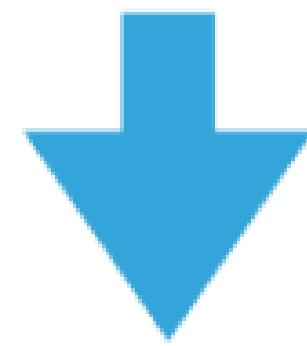
# CLASSIFICAÇÃO



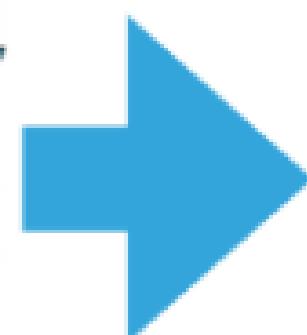
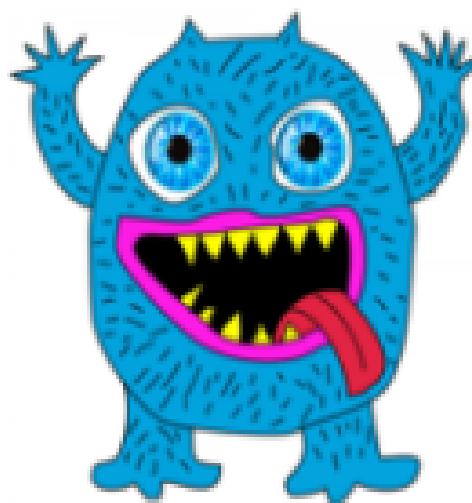
A



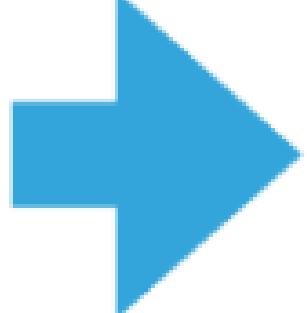
A



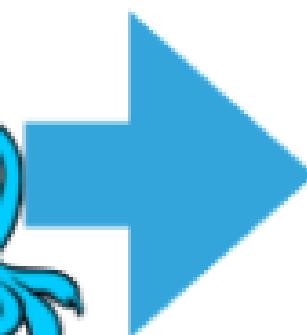
?



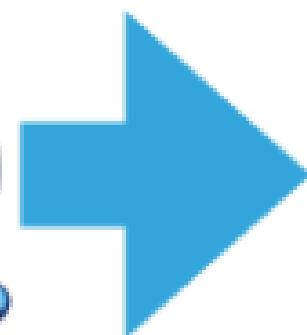
B



A



B



B



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***naubergois@gmail.com***