Università di Roma Tor Vergata

Programmare server

Frontend e Backend

Frontend e Backend

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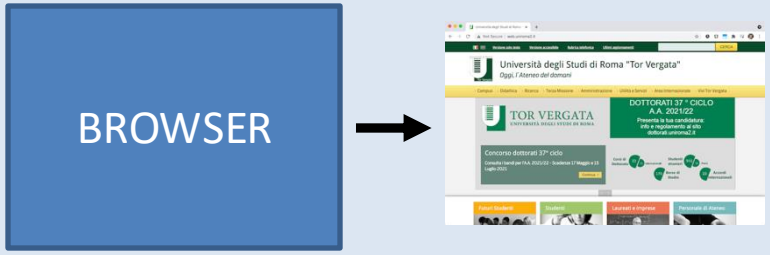

Frontend e Backend

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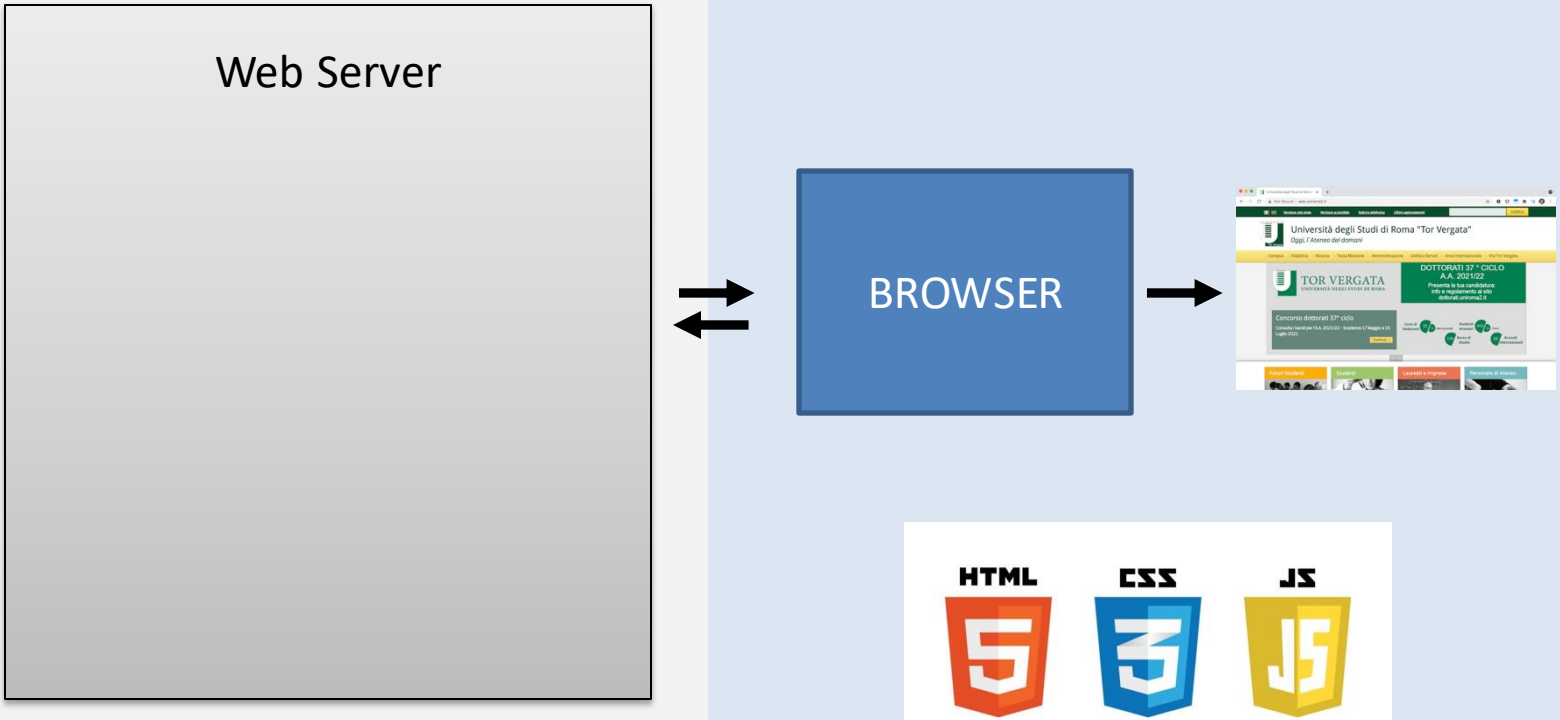

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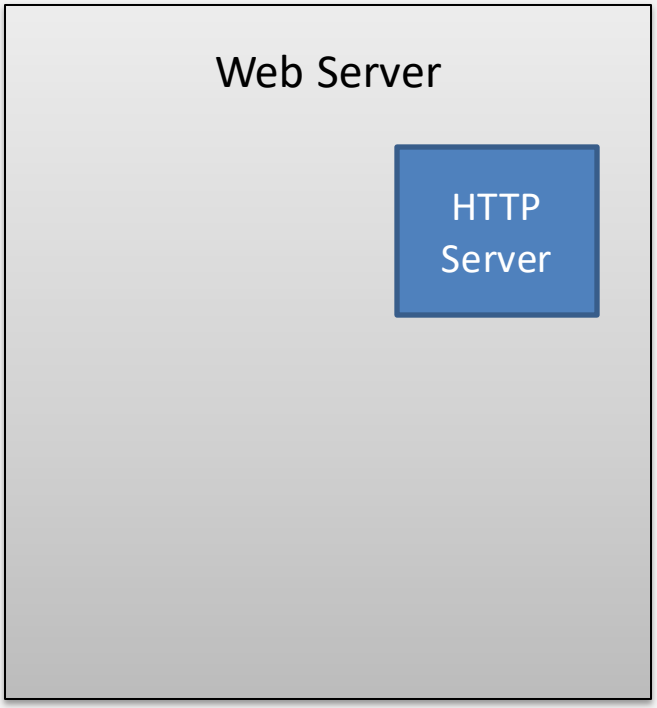
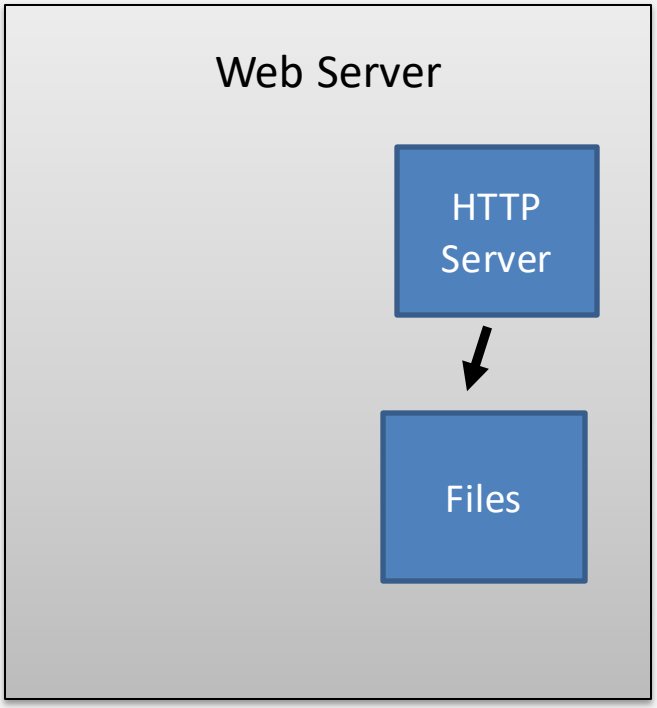
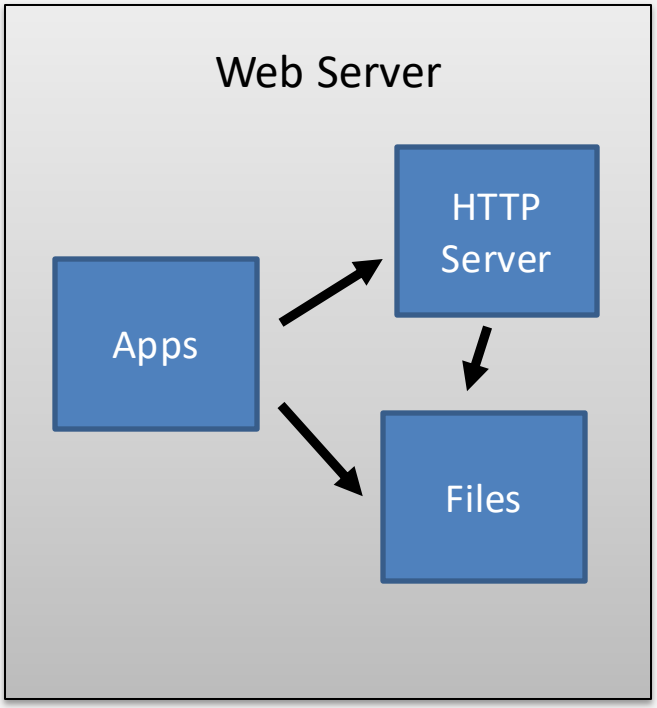


Frontend e Backend



Frontend e Backend



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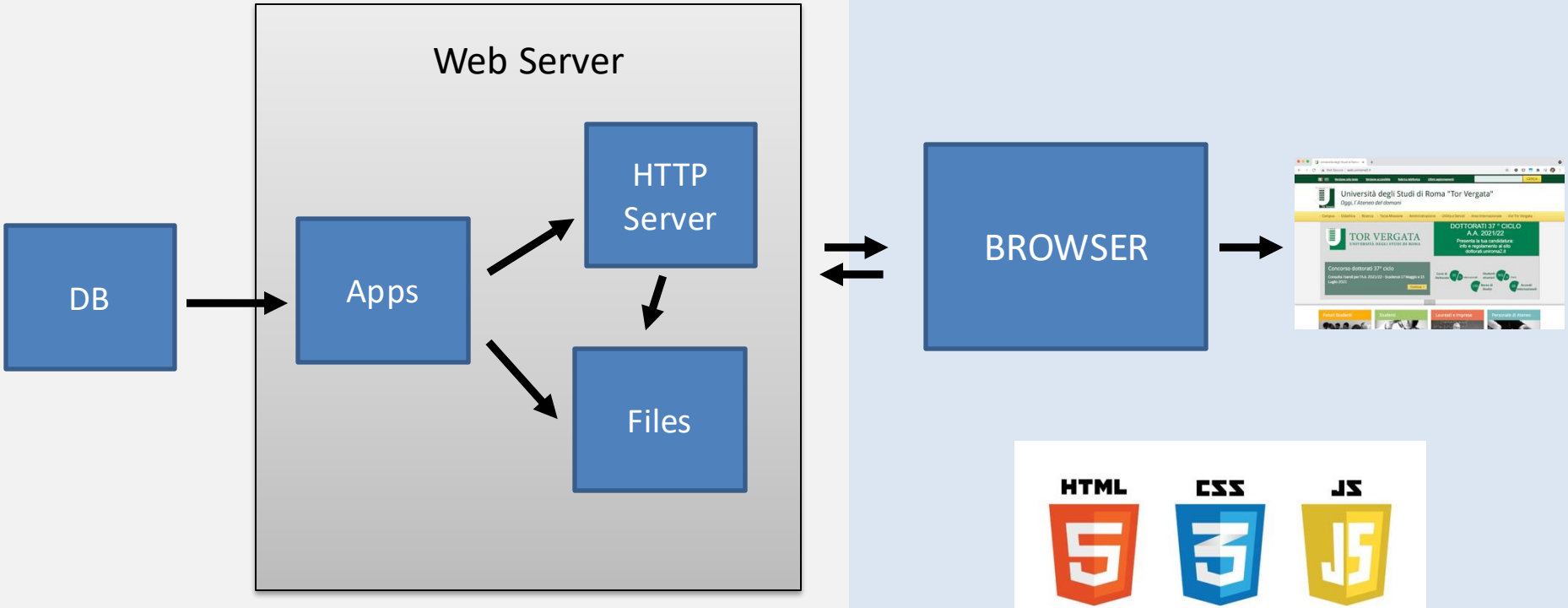

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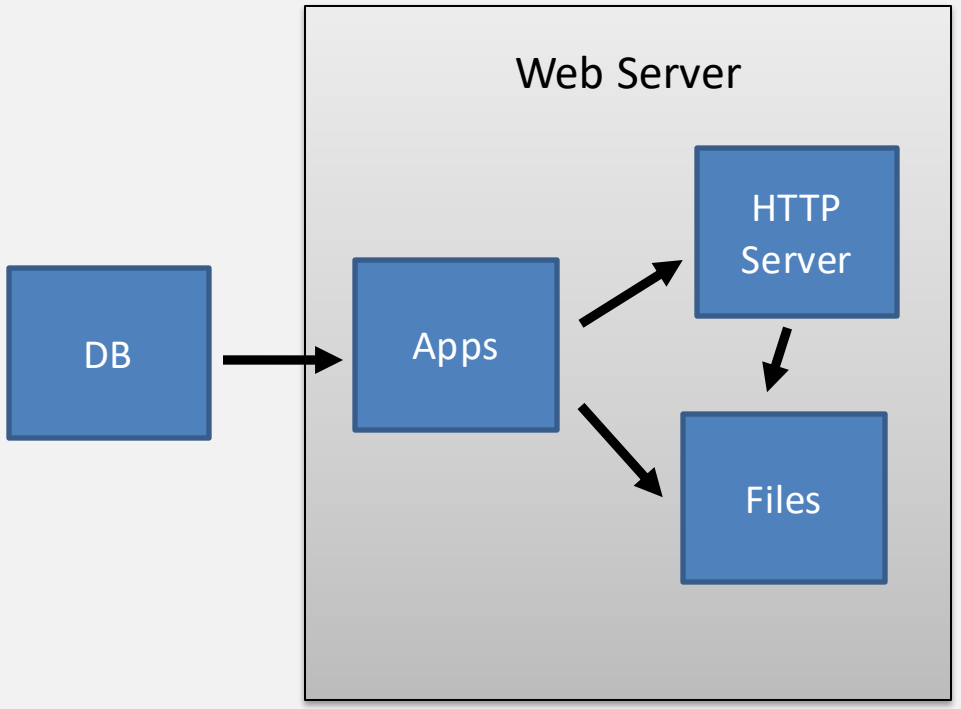
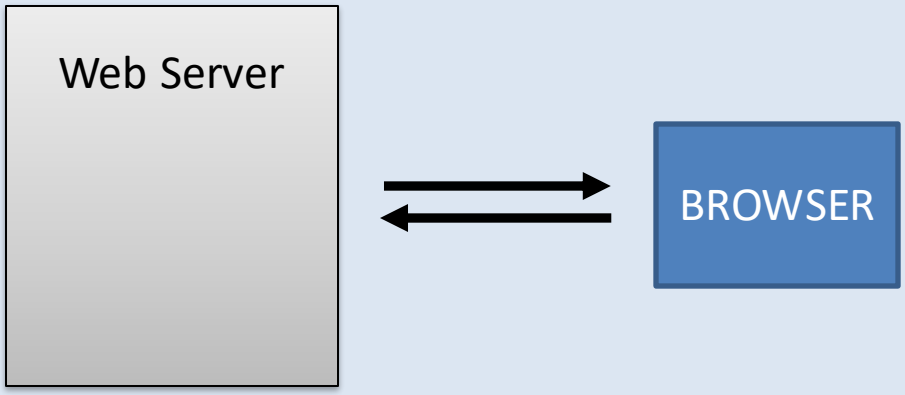


Siti statici vs dinamici

Siti statici vs dinamici



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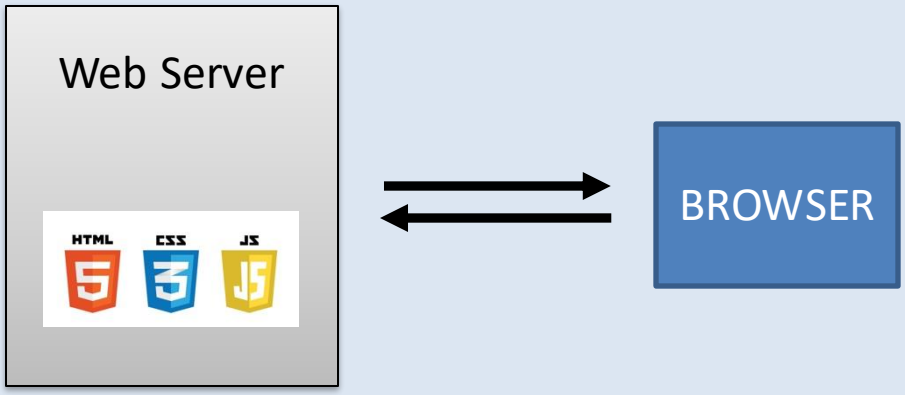

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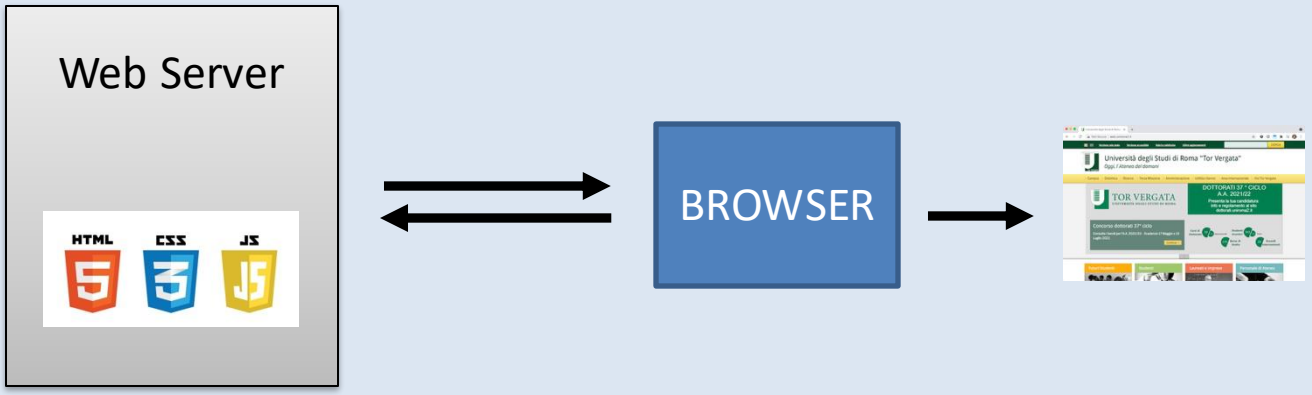

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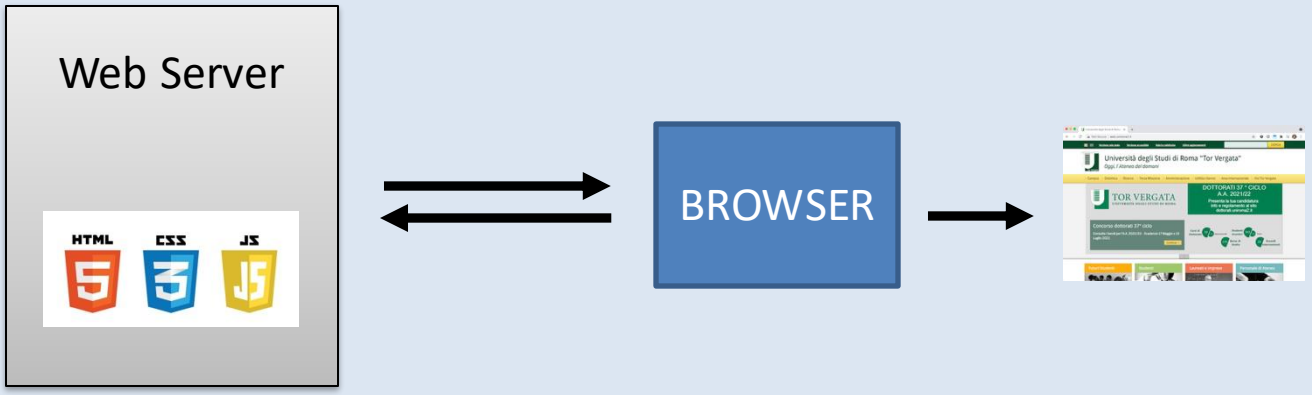
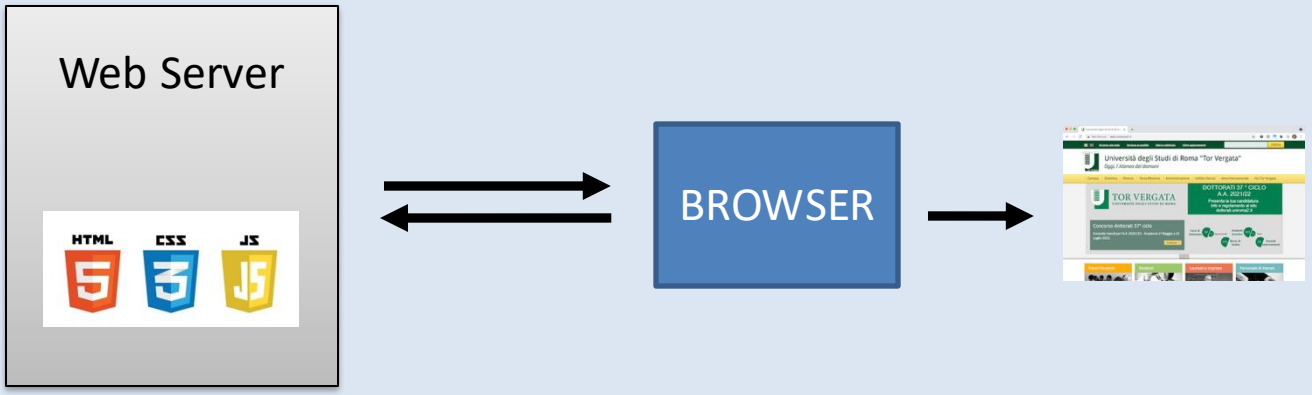
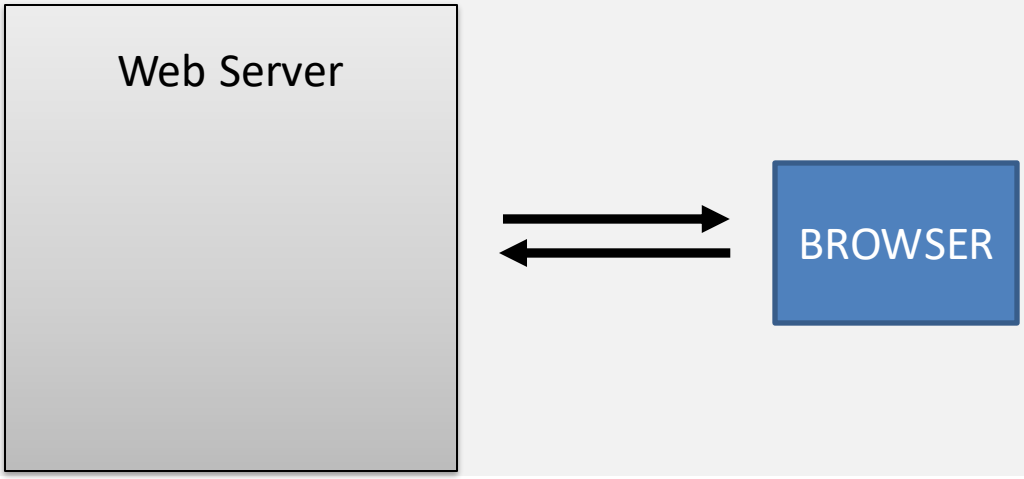


BROWSER

Siti statici vs dinamici





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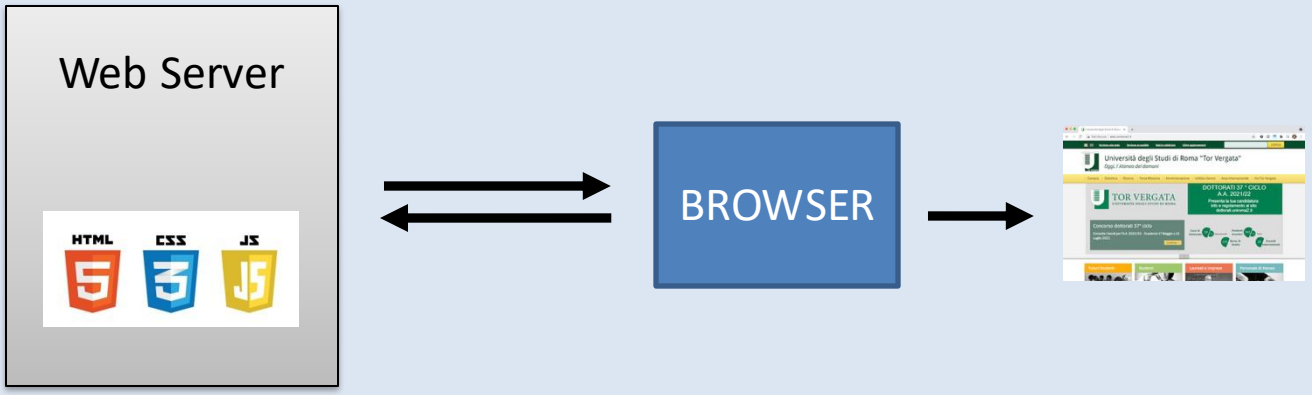

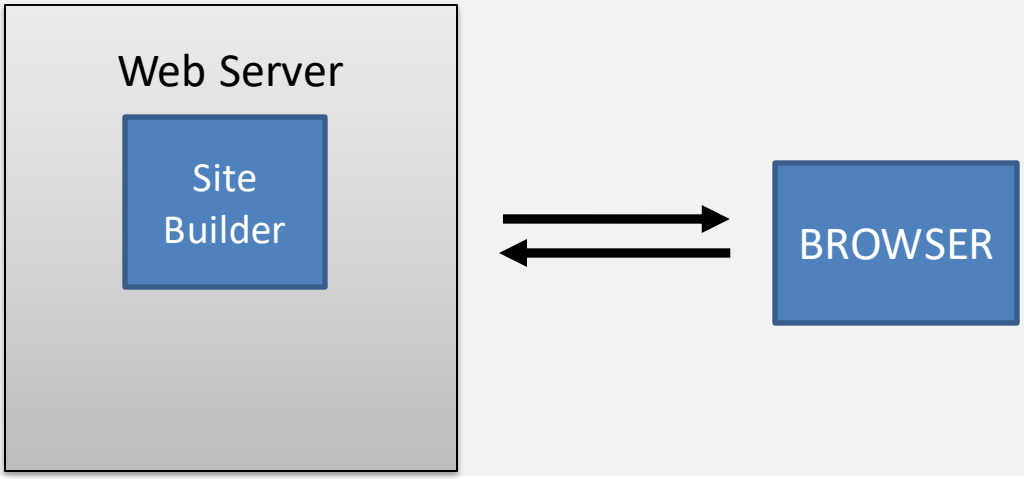

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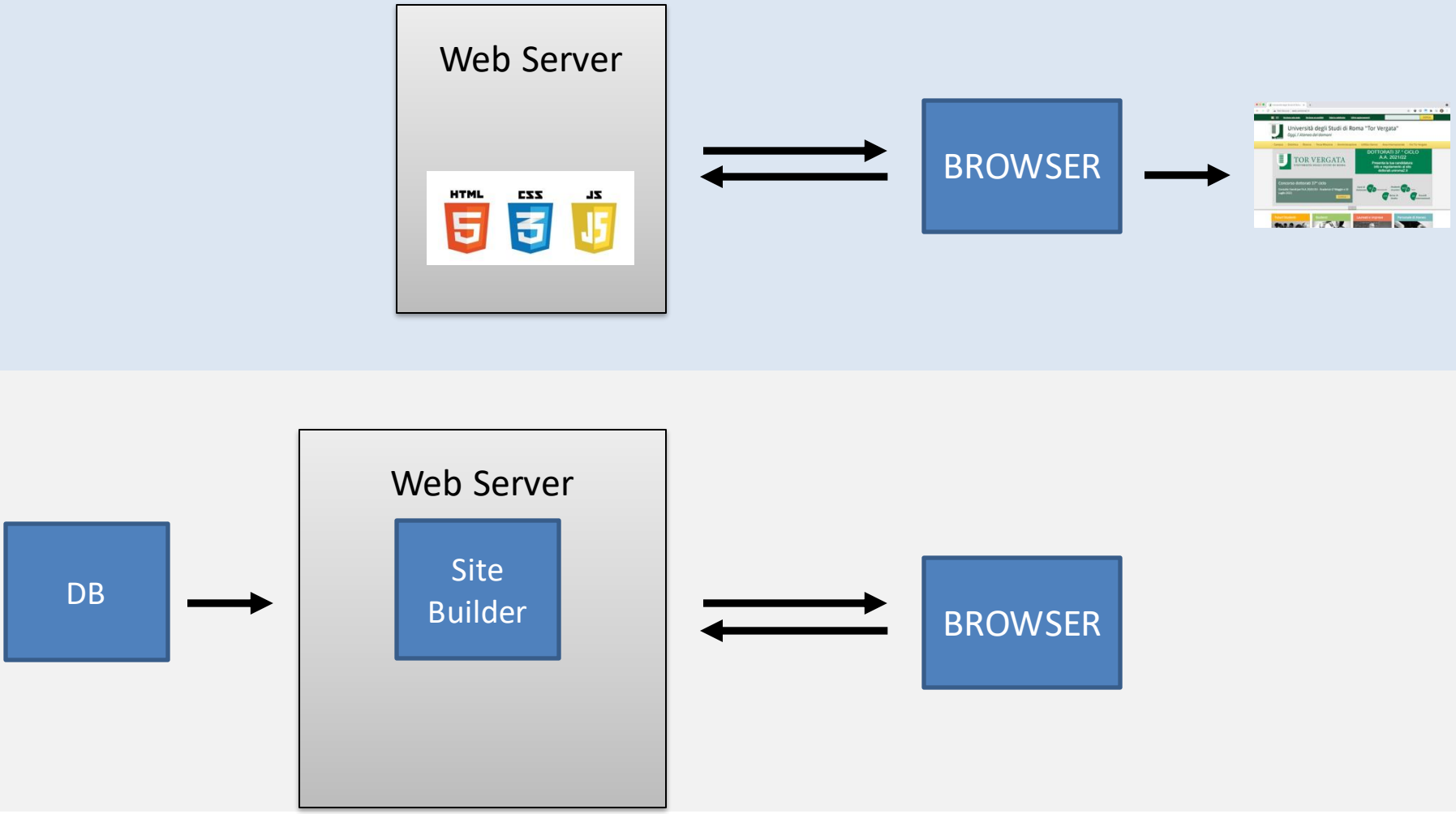

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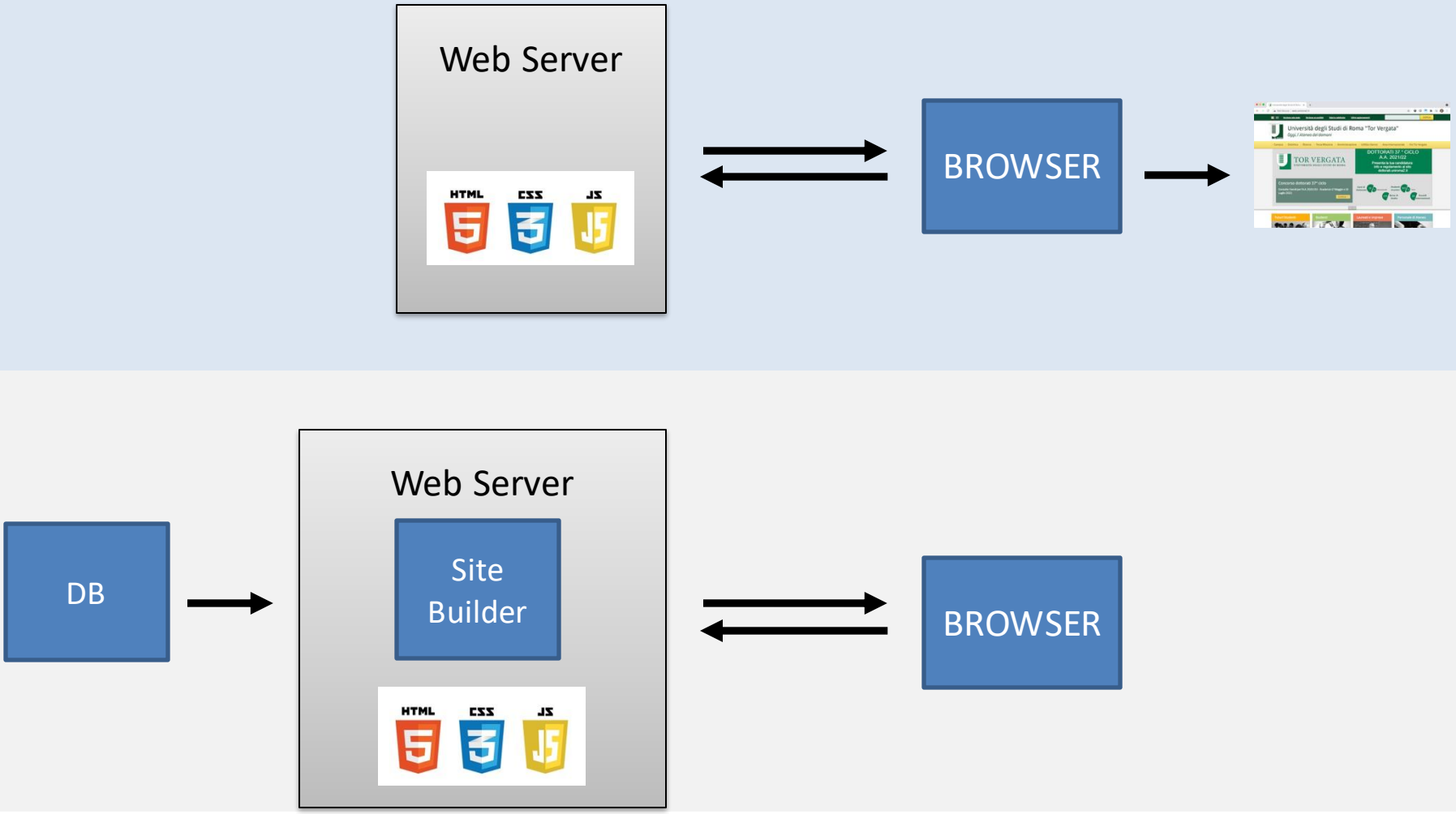

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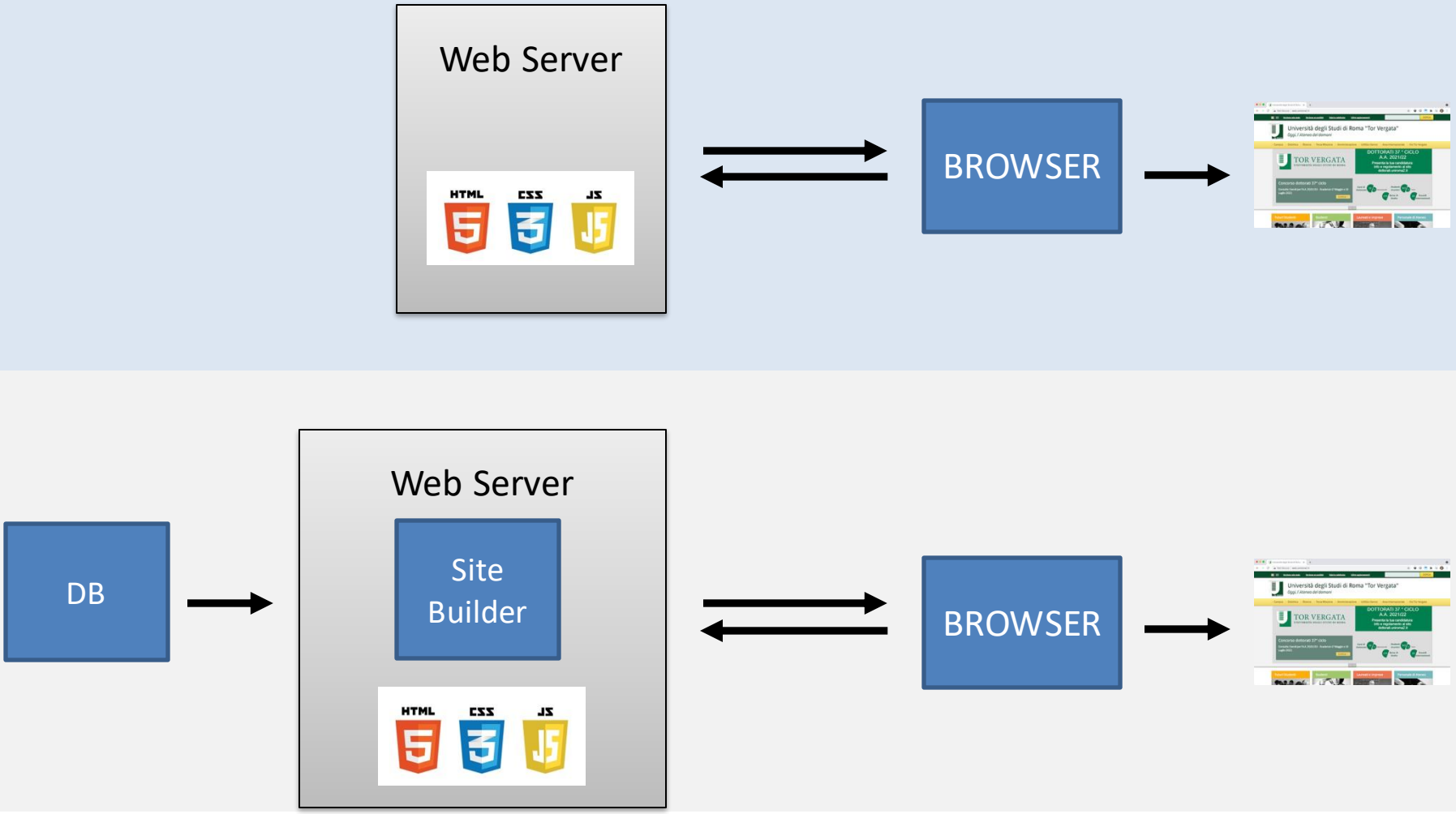
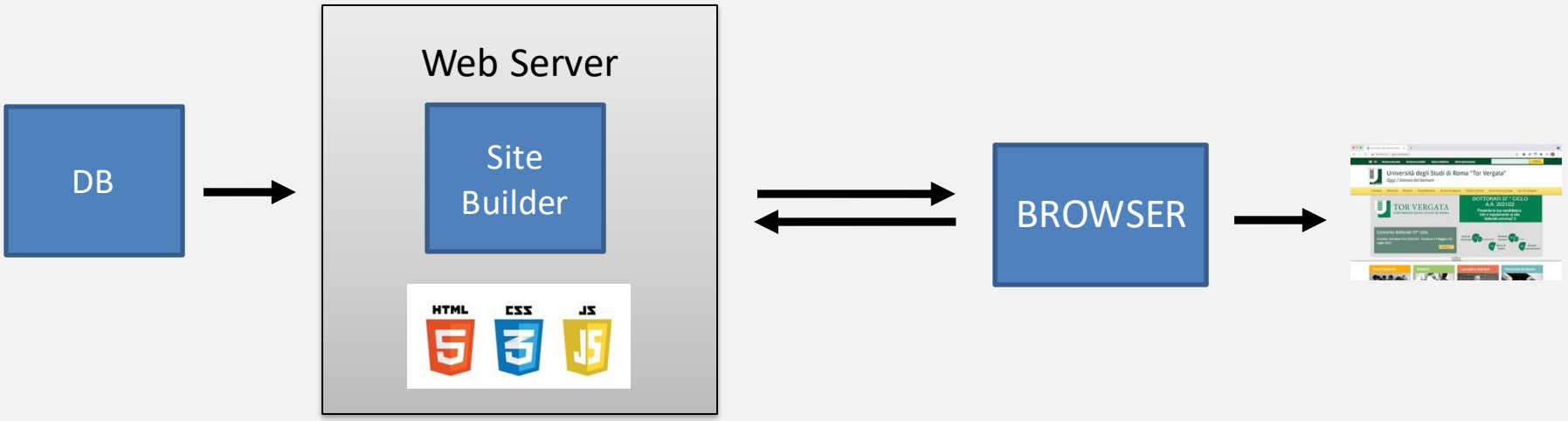


Siti dinamici vs API based



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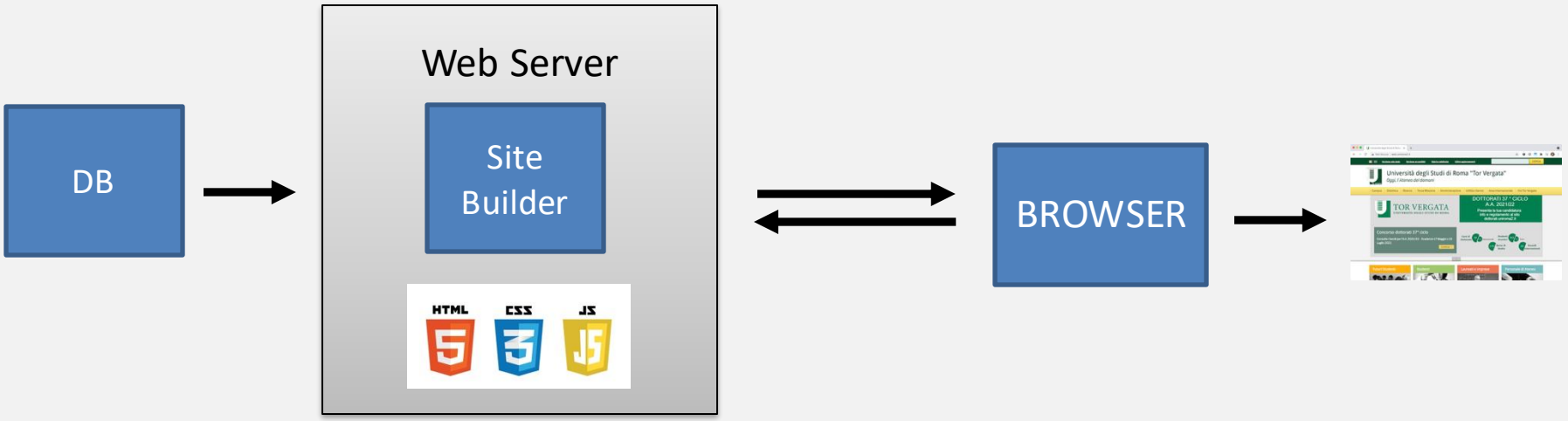
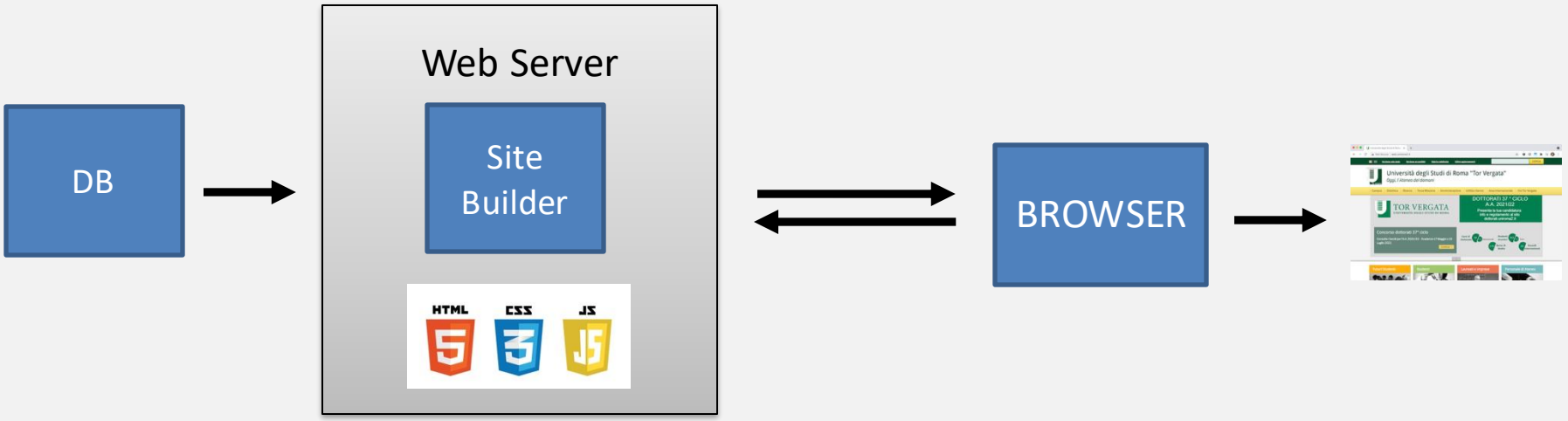
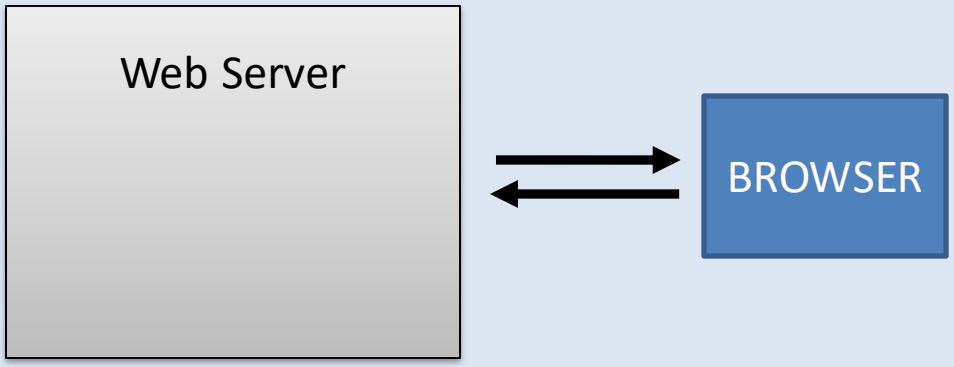


BROWSER

Siti dinamici vs API based





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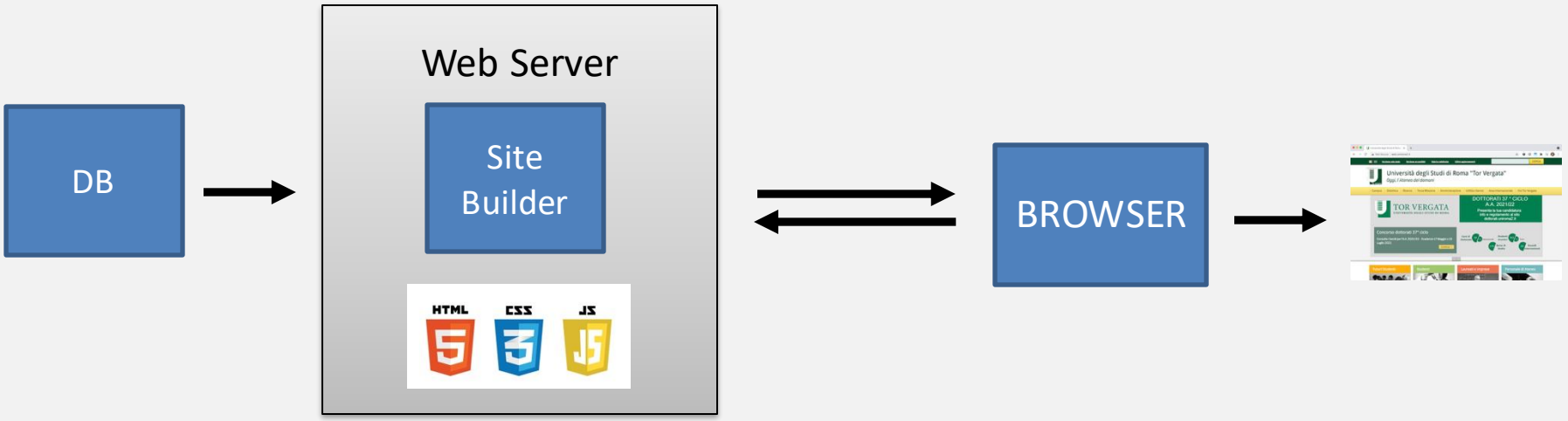

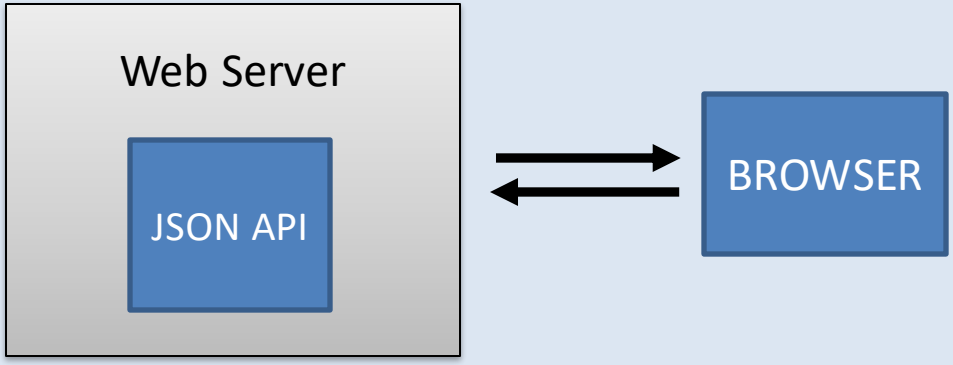

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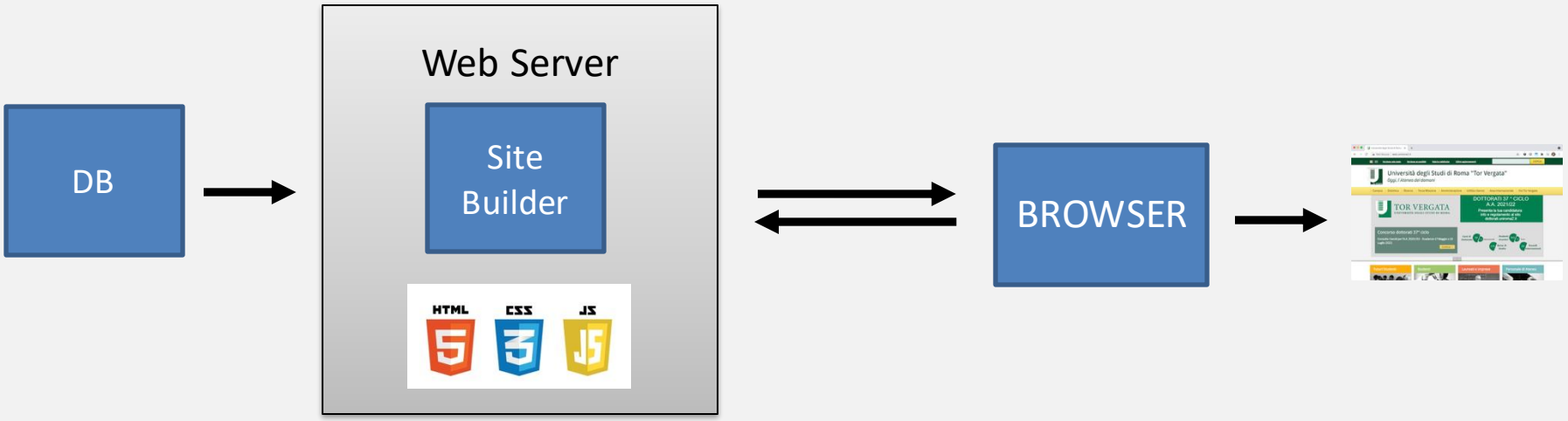

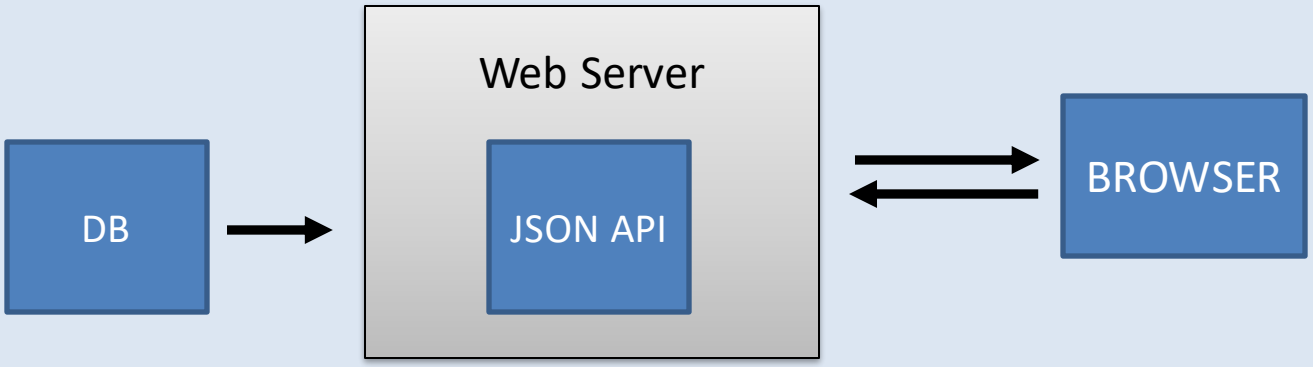

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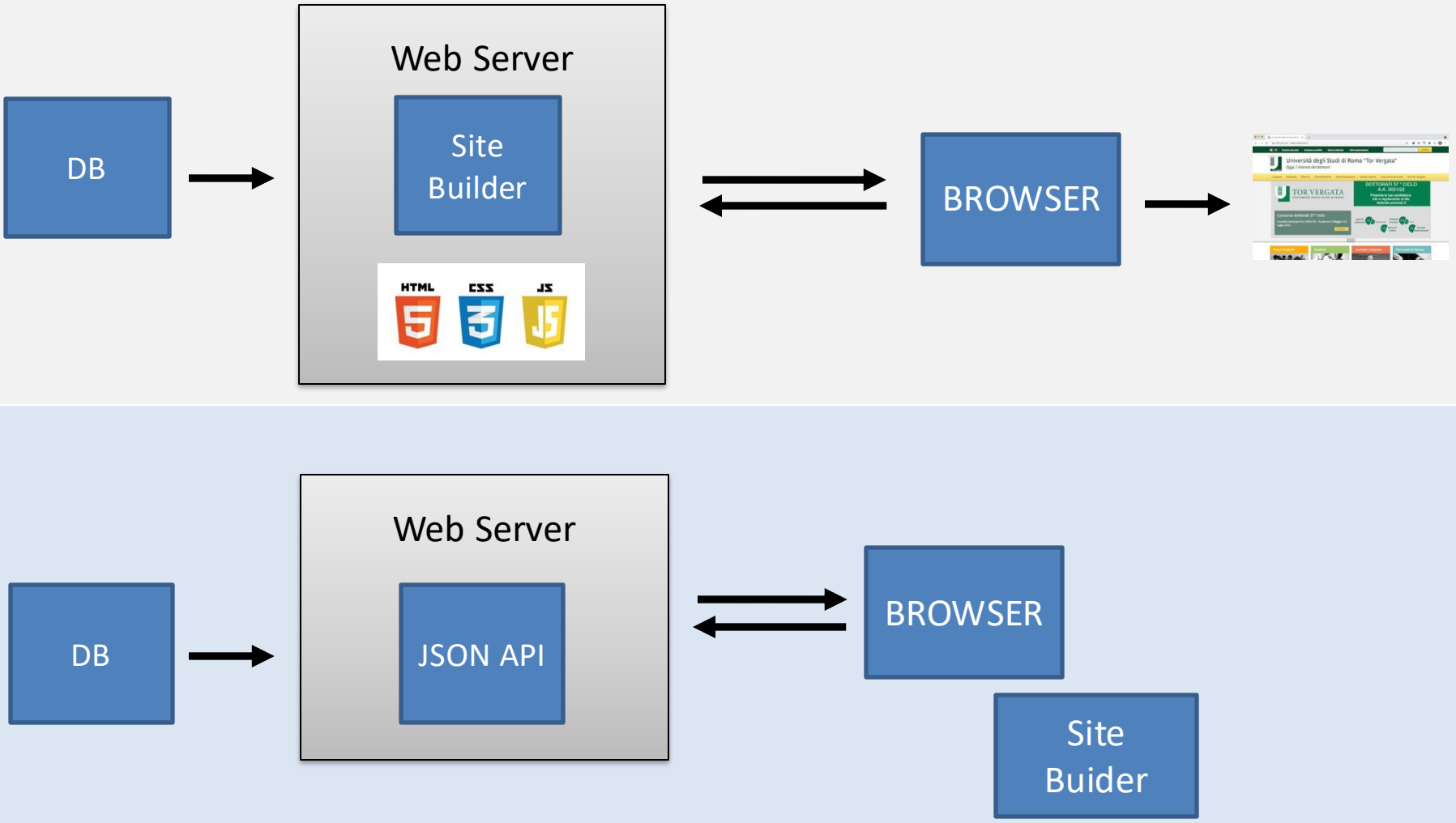

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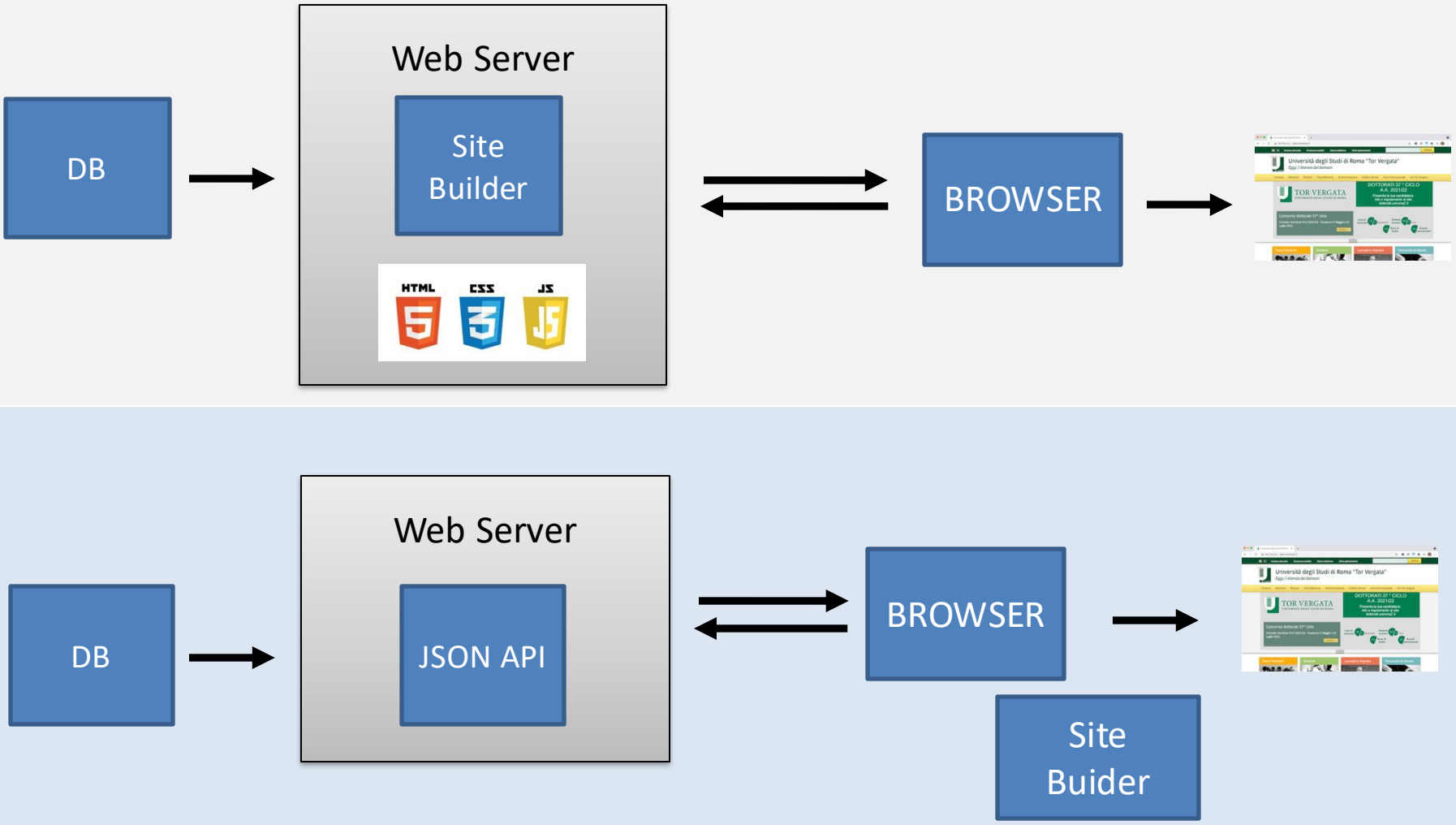
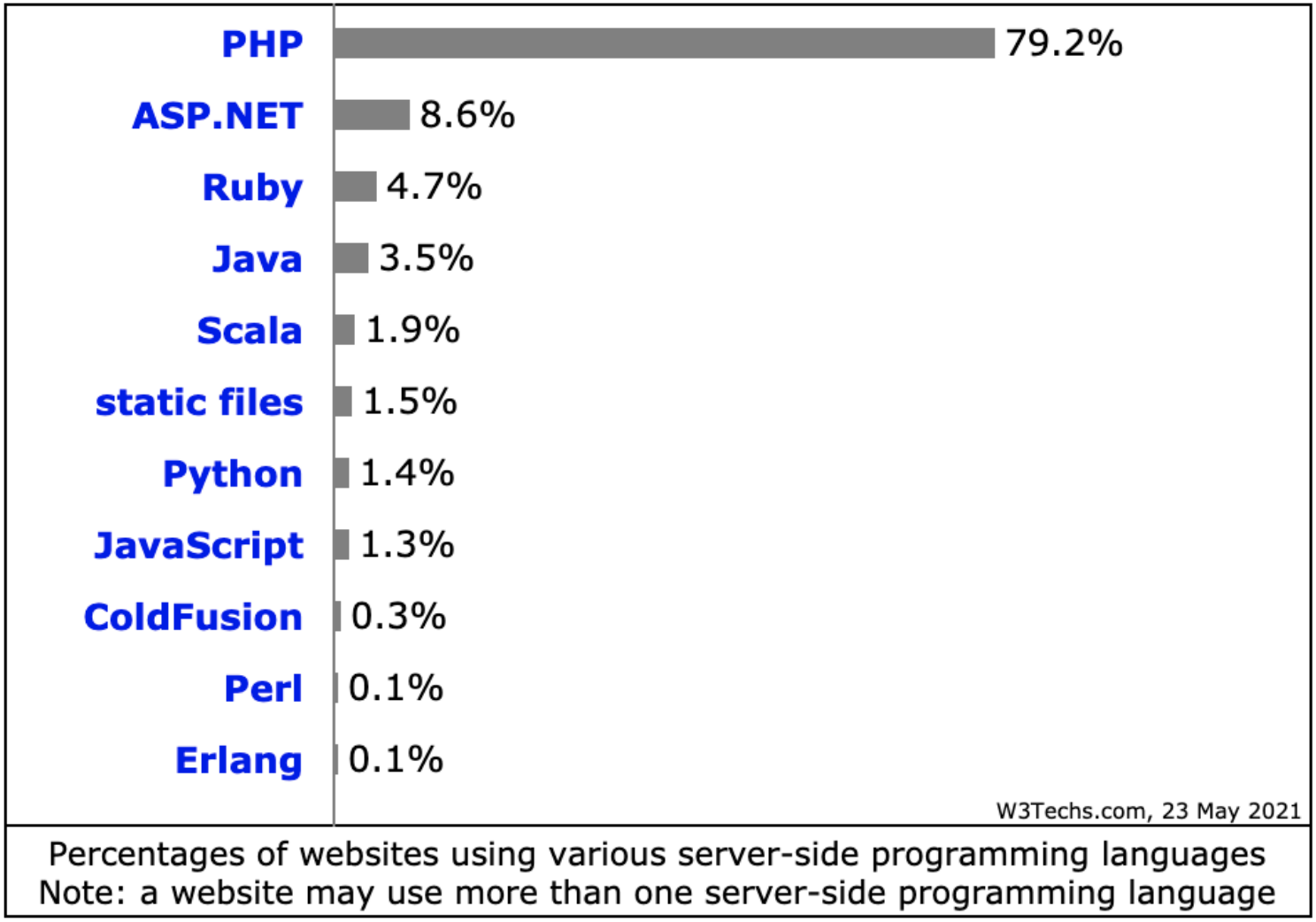
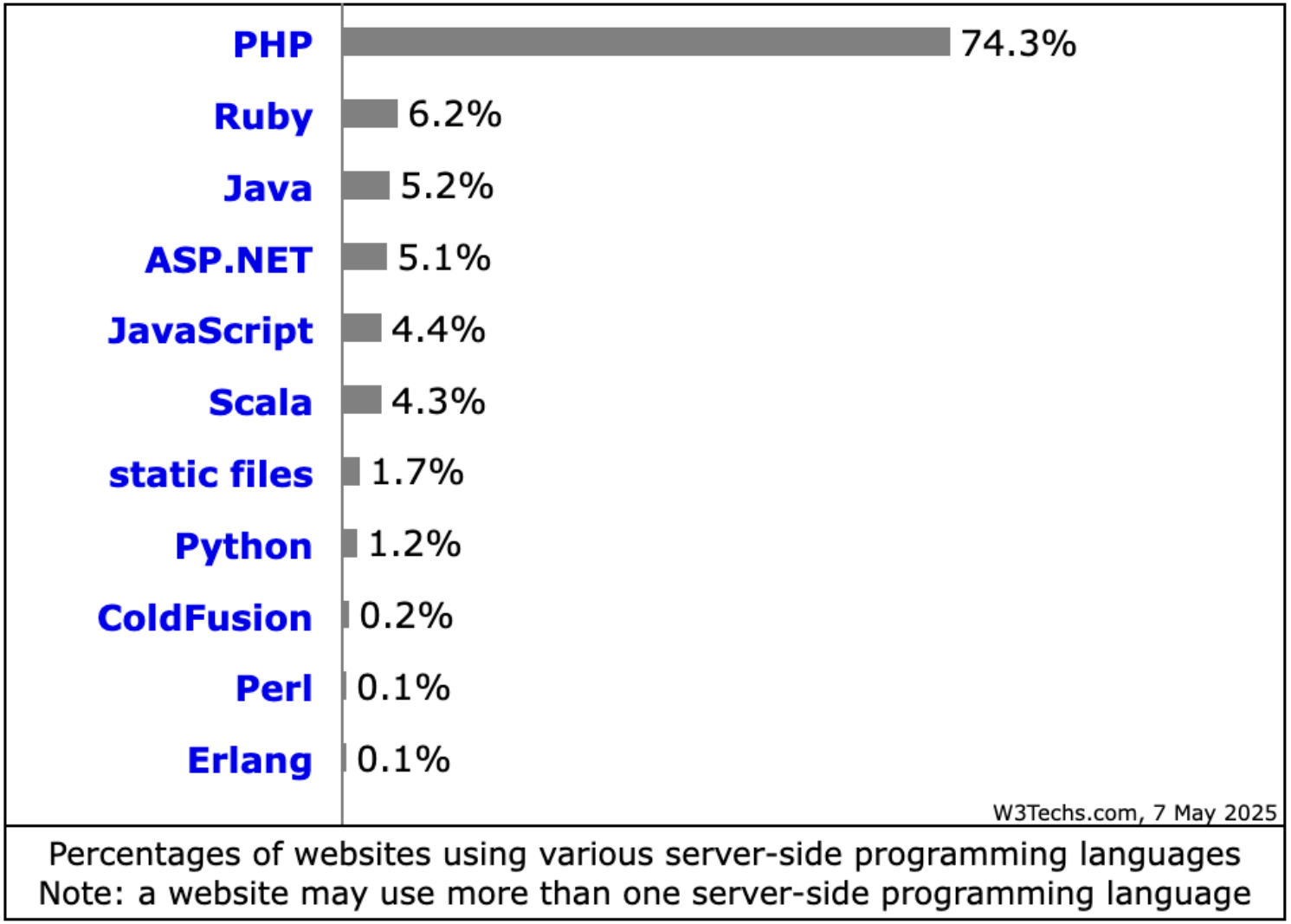


Tecnologie per backend

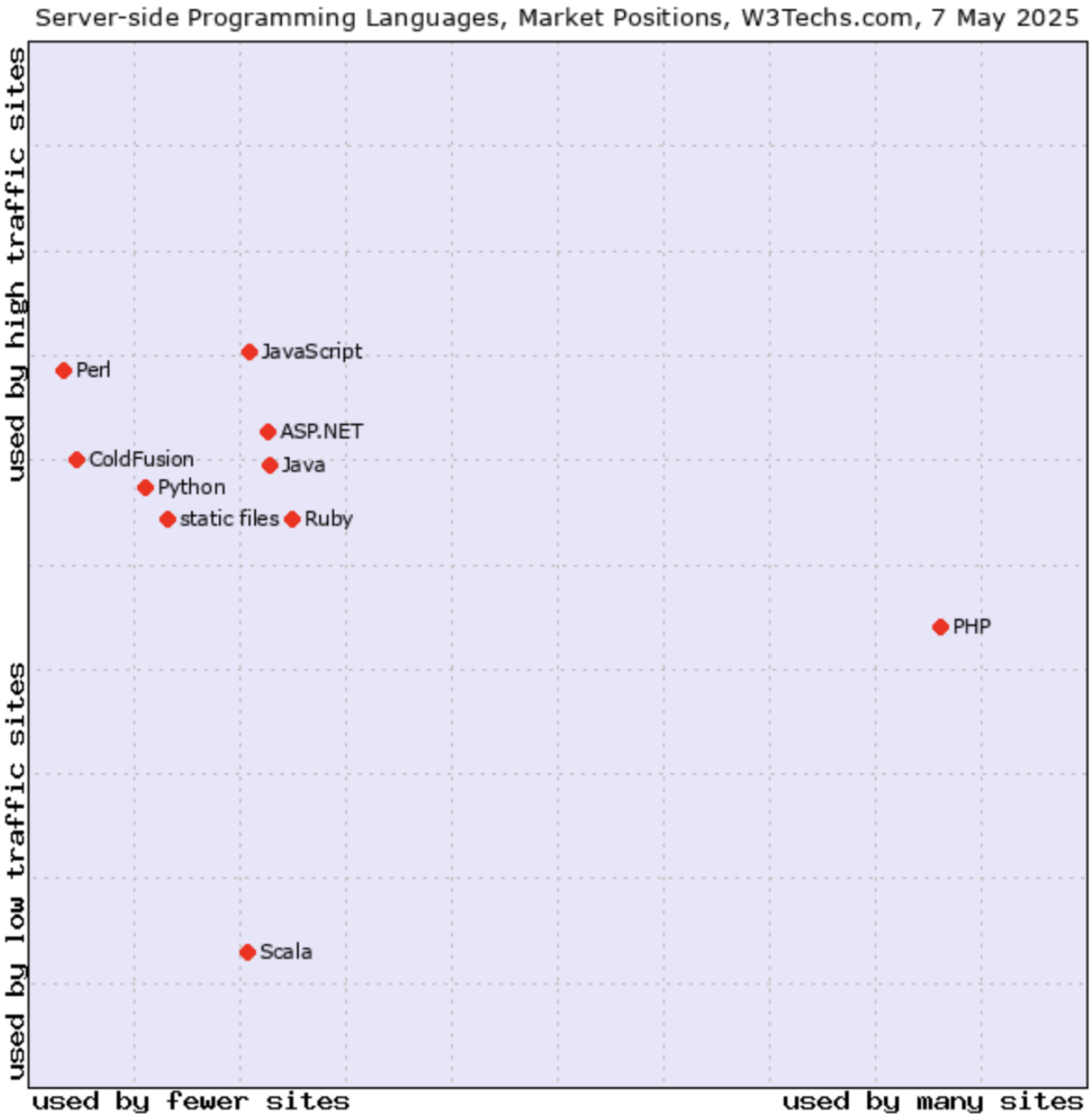


Percentages of websites using various server-side programming languages
Note: a website may use more than one server-side programming language

Tecnologie per backend



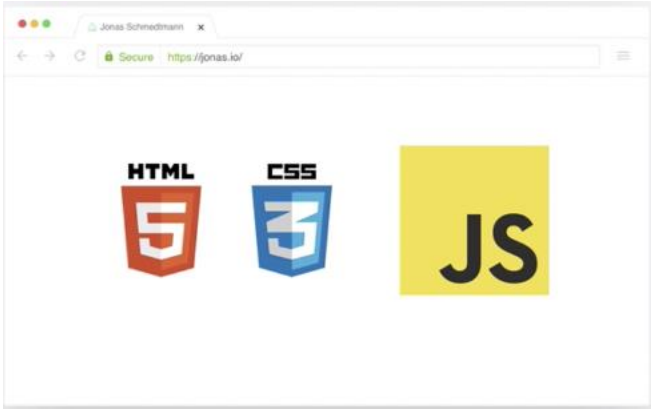
Percentages of websites using various server-side programming languages
Note: a website may use more than one server-side programming language


Server-side Programming Languages, Market Positions, W3Techs.com, 7 May 2025
used by high traffic sites
used by low traffic sites
used by fewer sites
used by many sites
JavaScript
Perl
ASP.NET
ColdFusion
Java
Python
static files
Ruby
PHP
Scala

NodeJS

node.js

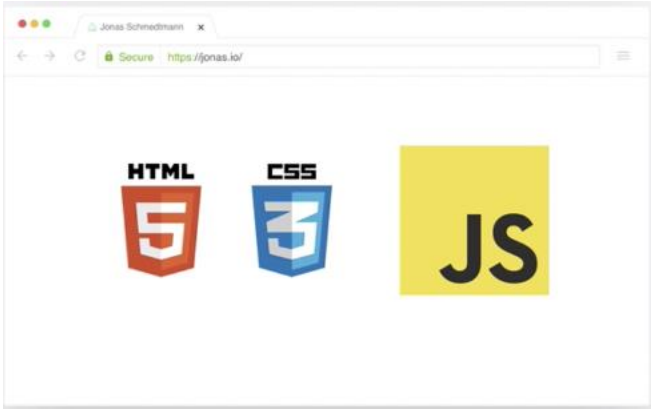

Google chrome


Jonas Schmedtmann
Secure
https://jonas.io/
HTML
CSS
JS

node.js


Google chrome


node
JS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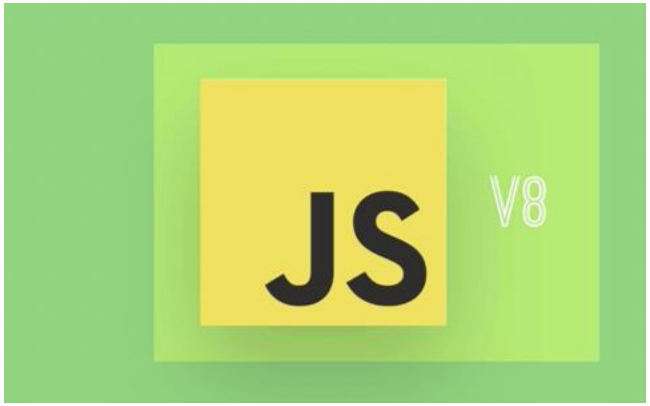
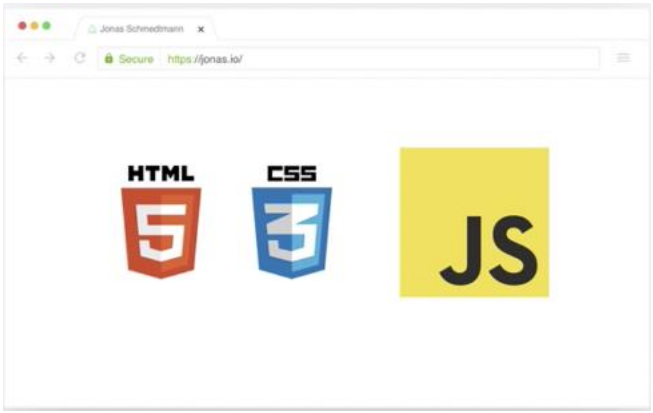
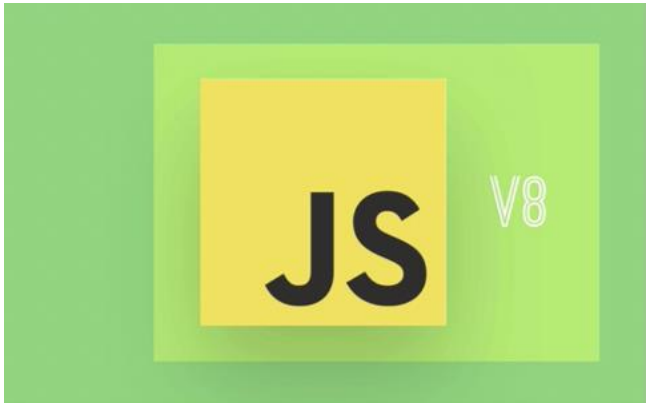

JS
V8

node.js





- Può essere considerato come un ambiente runtime per JavaScript costruito sopra il motore V8 di Google.
- Ci fornisce un contesto dove possiamo scrivere codice JavaScript su qualsiasi piattaforma dove Node.js può essere installato
- L'ambiente ideale dove usare node.js è il server

Architettura node.js

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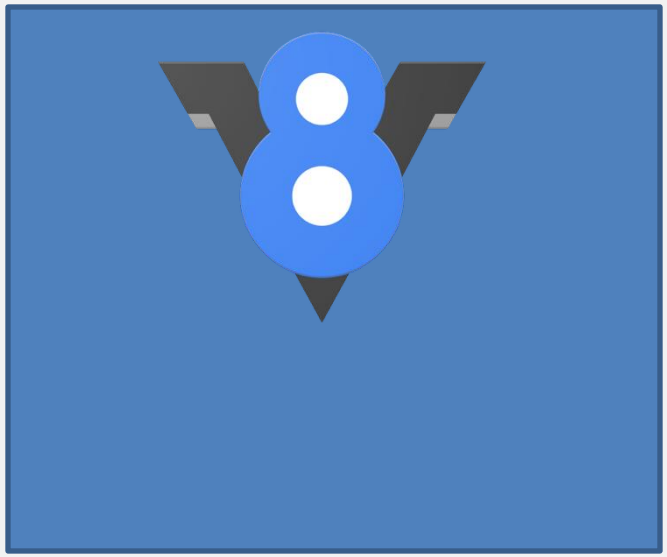
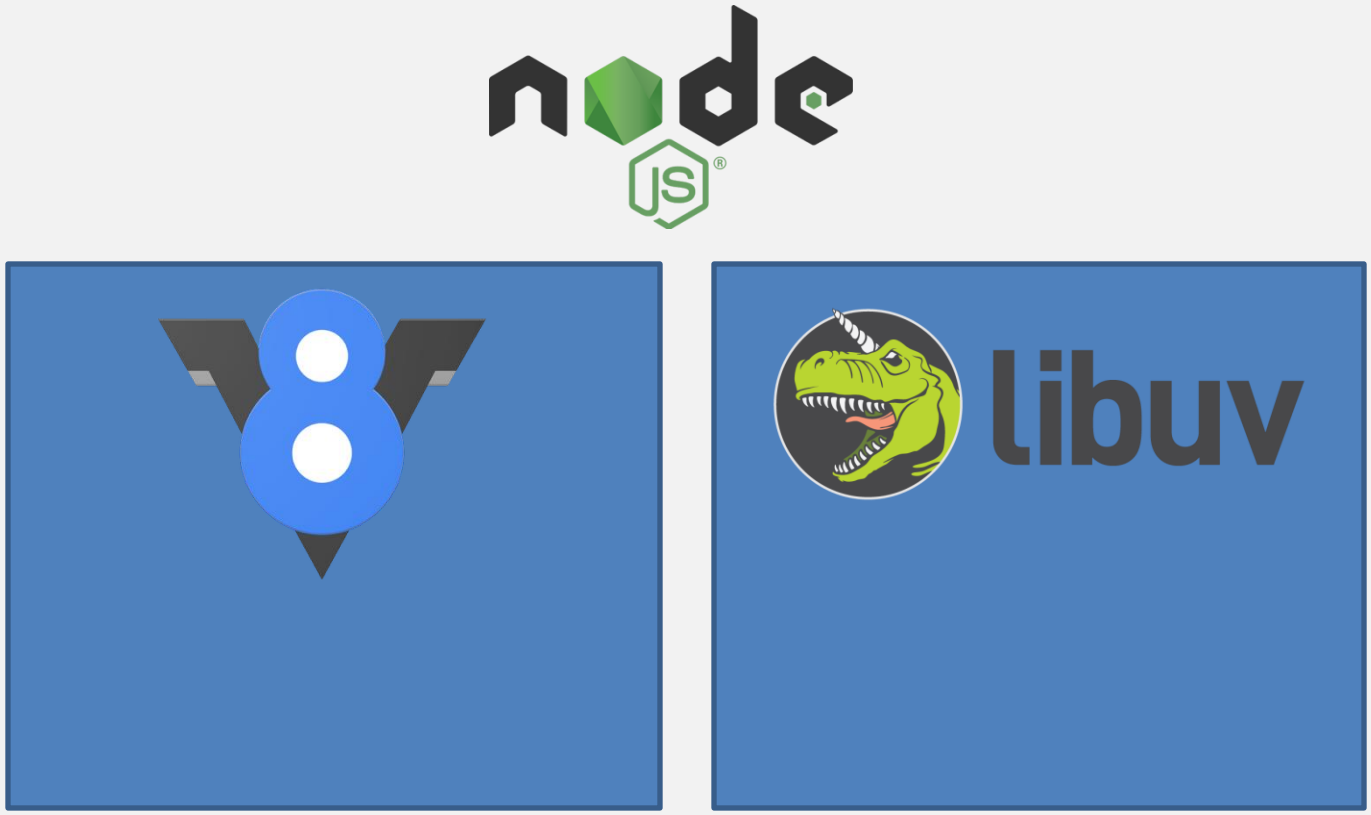


Architettura node.js



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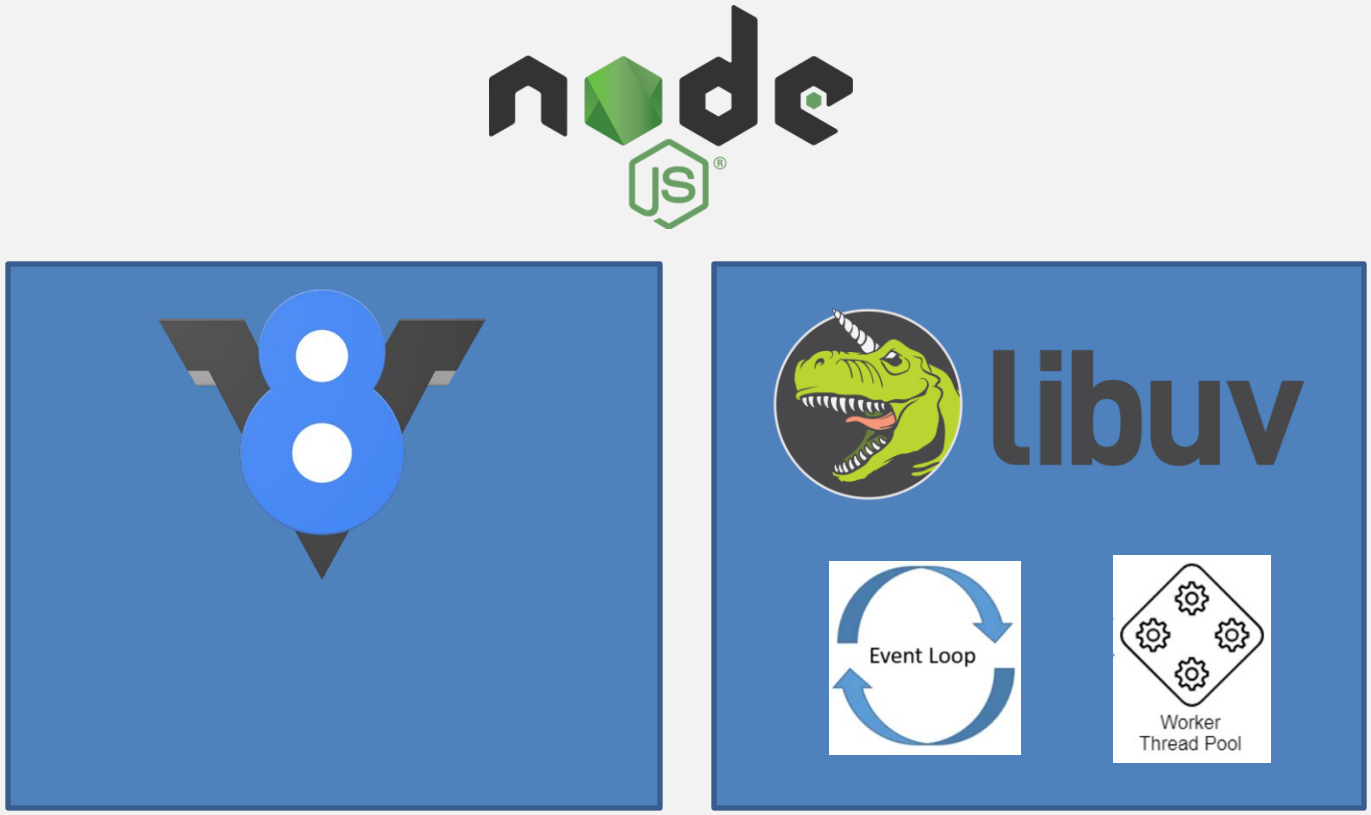
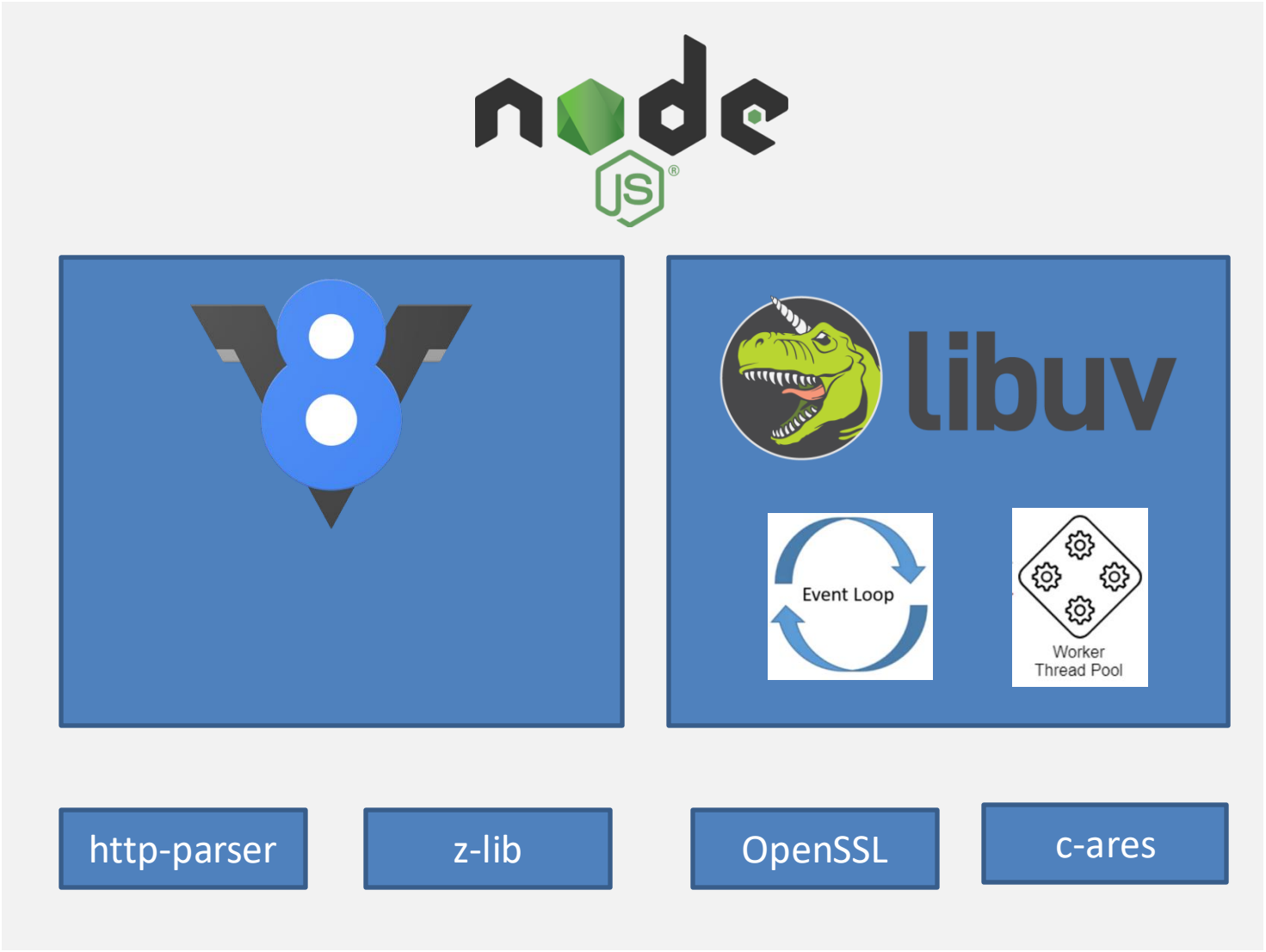
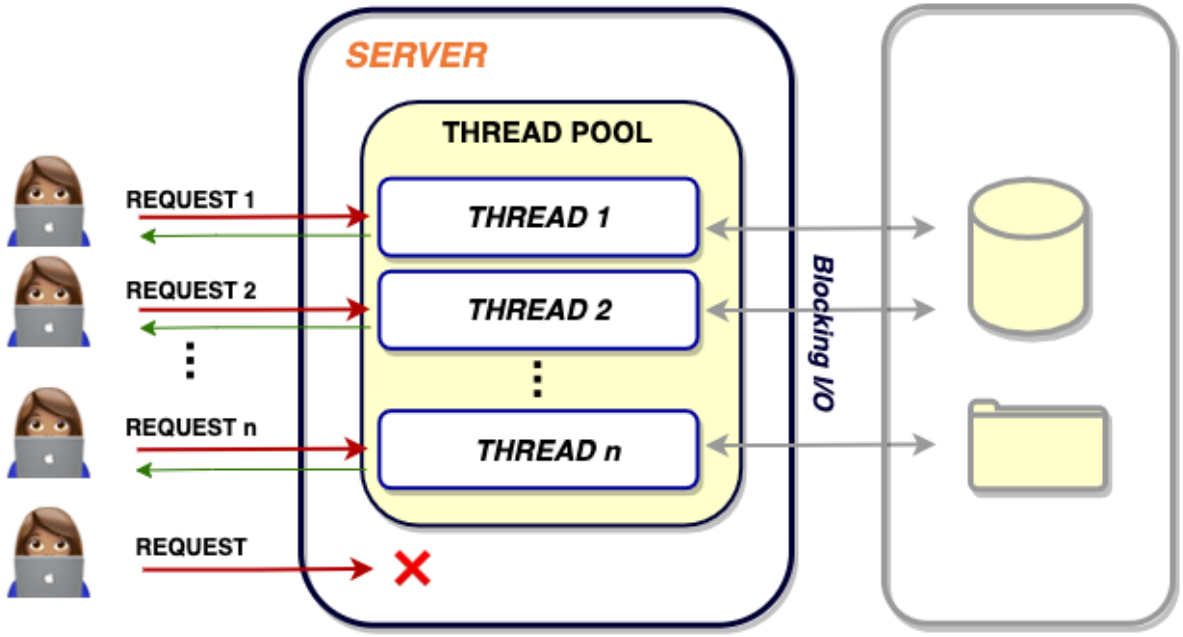


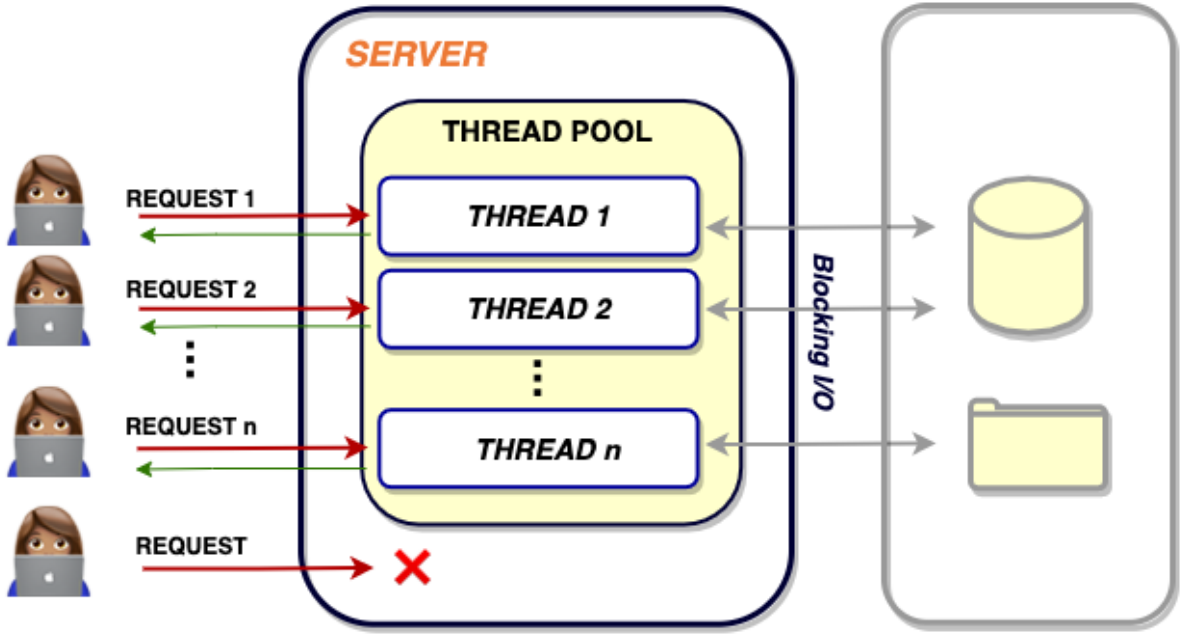
Architettura node.js

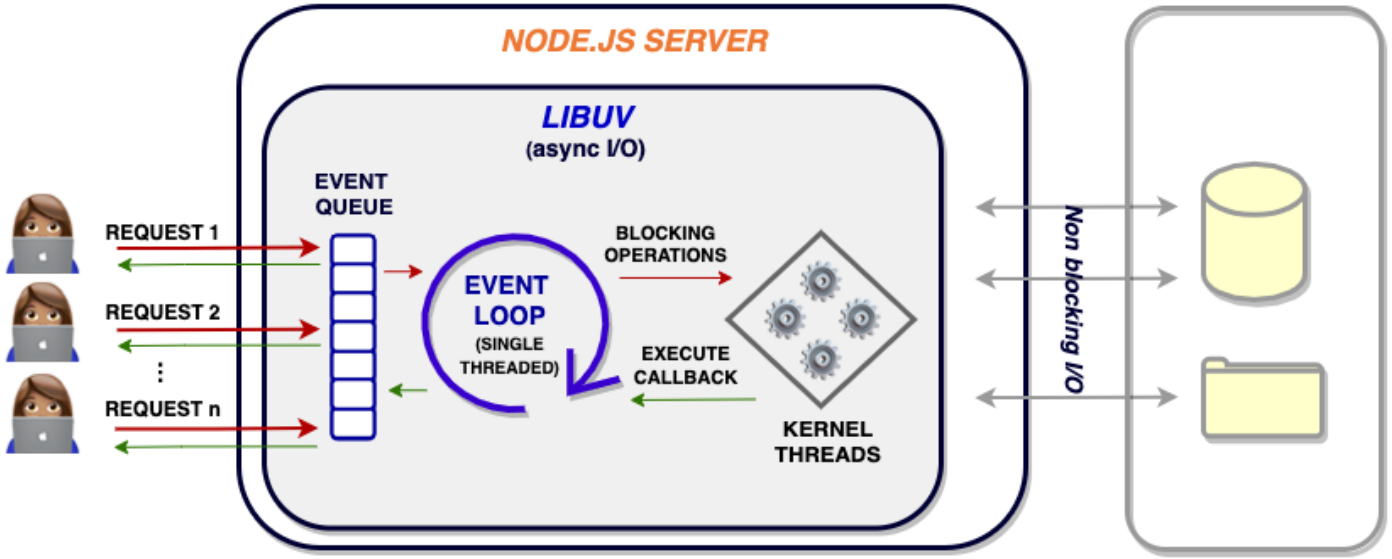


Architettura nodejs

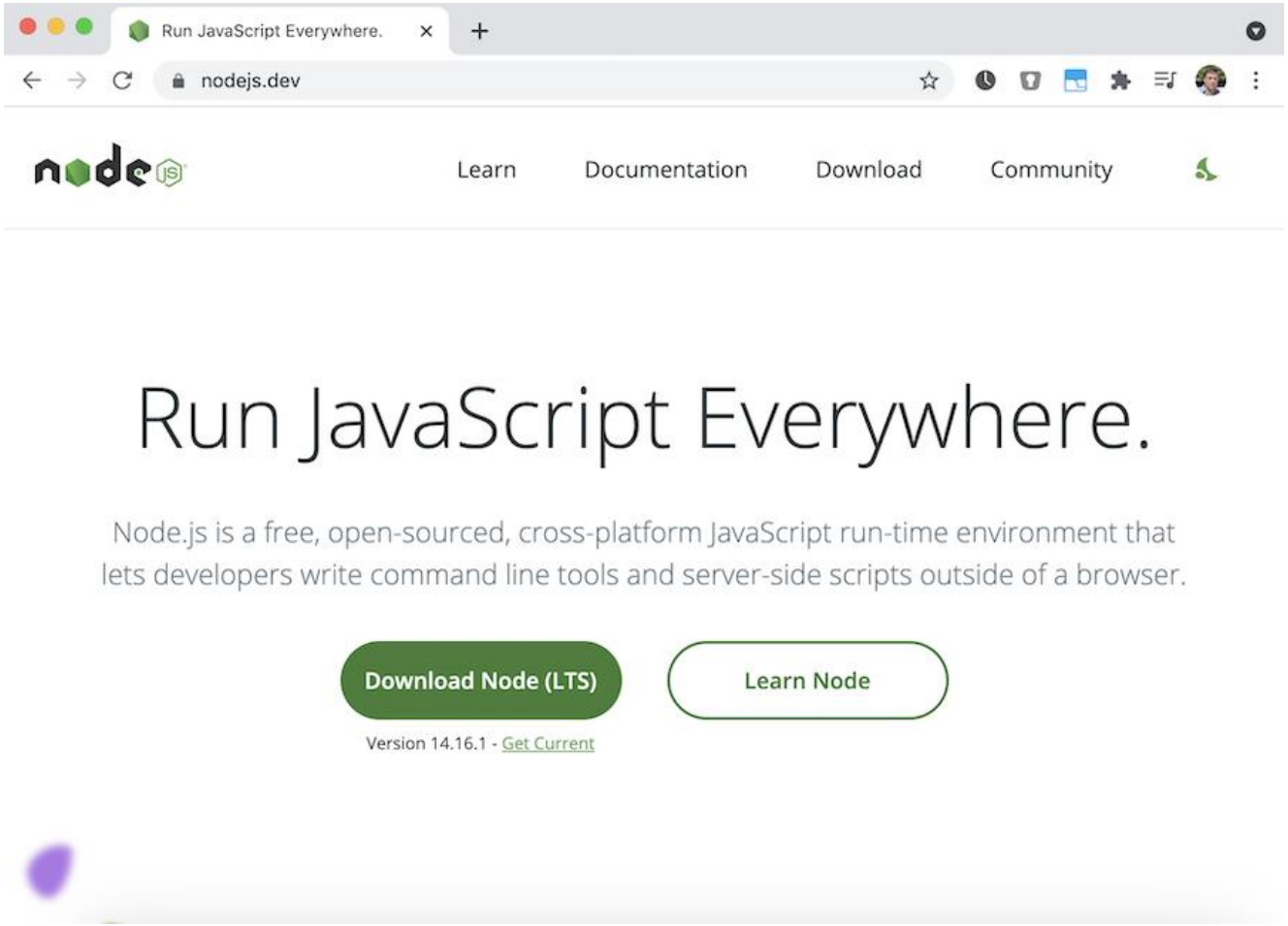


Architettura nodejs





Installazione



node hello world!!

JS es1.js

```
1  console.log('Hello World!!');
2
```

TERMINAL PROBLEMS OUTPUT DEBUG CONSOLE

```
(base) PPL3:basic loreti$ node es1.js
Hello World!!
(base) PPL3:basic loreti$
```

Moduli

- A reusable piece of code that incapsulates implementation detail
- Modules can load each other and use special directives to export and import functionality

- Moduli in JS
  - AMD – one of the most ancient module systems, initially implemented by the library require.js.
  - **CommonJS** – the module system created for Node.js server.
  - **ES6 Moduls** - language-level module system appeared in the standard in 2015

Node Module

- **Core Modules**
  - di sistema installati con node
- **Local Modules**
  - Li creiamo localmente
- **Third Party Modules**
  - li dobbiamo installare (con npm)

Core Module

Core Module	Description
http	http module includes classes, methods and events to create Node.js http server.
url	url module includes methods for URL resolution and parsing.
querystring	querystring module includes methods to deal with query string.
path	path module includes methods to deal with file paths.
fs	fs module includes classes, methods, and events to work with file I/O.
util	util module includes utility functions useful for programmers.

Esempio fs

JS es2.js

```
1   const fs = require('fs');
2
3   fs.readFile('./data/input.txt', 'utf-8', (err, data) => {
4     console.log('Async');
5     console.log(data);
6   });
7
8   const data = fs.readFileSync('./data/input.txt', 'utf-8');
9   console.log(data);
10  console.log('----\n');
```

Esempio web server

```
1   const http = require('http');
2
3   const server = http.createServer((req, res) => {
4     const pathName = req.url;
5     if (pathName === '/' || pathName === '/home') {
6       res.end('Home page');
7     } else if (pathName === '/contatti') {
8       res.end('Contatti');
9     } else {
10      res.writeHead(404, {
11        'Content-type': 'text/html',
12      });
13      res.end('<h1>404 - Page Not foud</h1>');
14    }
15  });
16
17  const port = 8000;
18
19  server.listen(port, '127.0.0.1', () => {
20    console.log(`Server listening on port ${port}`);
21  });
```

Esempio web

```
const http = require("http");
const fs = require("fs");

const server = http.createServer((req, res) => {
    console.log(req.url);

    fs.readFile(__dirname + req.url, (err, data) => {
        if (err) {
            res.writeHead(404);
            res.end("Errore " + err.message);
            return;
        }

        res.end(data);
    });
});

const PORT = 8080;

server.listen(PORT, () => {
    console.log(`Server in ascolto sulla ${PORT}`);
});
```

Routing

```
const pathName = req.url;
if (pathName === '/' || pathName === '/home') {
  res.end('Home page');
} else if (pathName === '/contatti') {
  res.end('Contatti');
} else if (pathName === '/info') {
  res.end('Info Page');
} else if (pathName === '/api') {
  res.writeHead(404, {
    'Content-type': 'appilication/json',
  });
  res.end('Info Page');
} else {
  res.writeHead(404, {
    'Content-type': 'text/html',
  });
  res.end('<h1>404 - Page Not foud</h1>');
}
```

Per ***Routing*** si intende determinare come un'applicazione risponde a una richiesta client a un endpoint particolare, il quale è un URI (o percorso) e un metodo di richiesta HTTP specifico (GET, POST e così via).

COMMON JS MODULES

Esempio 1

myData.js

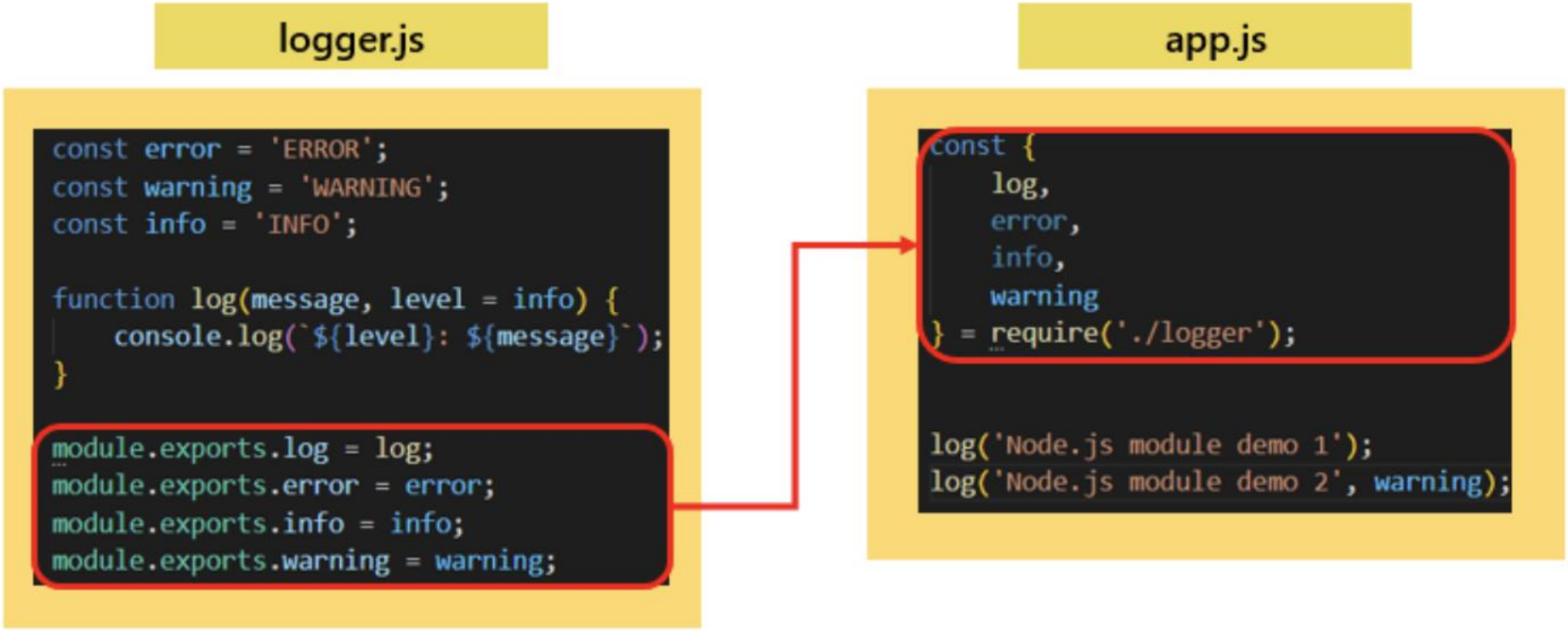
```
const my_obj={
  a: 1,
  b: 2,
  c: 3
}

module.exports = my_obj
```

myFunc.js

```
const log = function(txt){
  console.log(txt)
}

module.exports = log;
```

```
const data = require('./myData')
const log = require('./myFunc')


console.log(data)

log("Ciao a tutti")
```

Esempio 2



https://www.javascripttutorial.net/nodejs-tutorial/nodejs-modules/

Esempio 3

```
1   const fs = require('fs');
2
3   const data = JSON.parse(
4     fs.readFileSync(`${__dirname}/data/data.json`, 'utf-8')
5   );
6
7   console.log(data);
8   exports.getAll = function () {
9     return JSON.stringify(data);
10  };
11
12  exports.getItem = function (index) {
13    return JSON.stringify(data.find((el) => el.id == index));
14  };
```

```
const { getAll, getItem } = require('./lista');
```

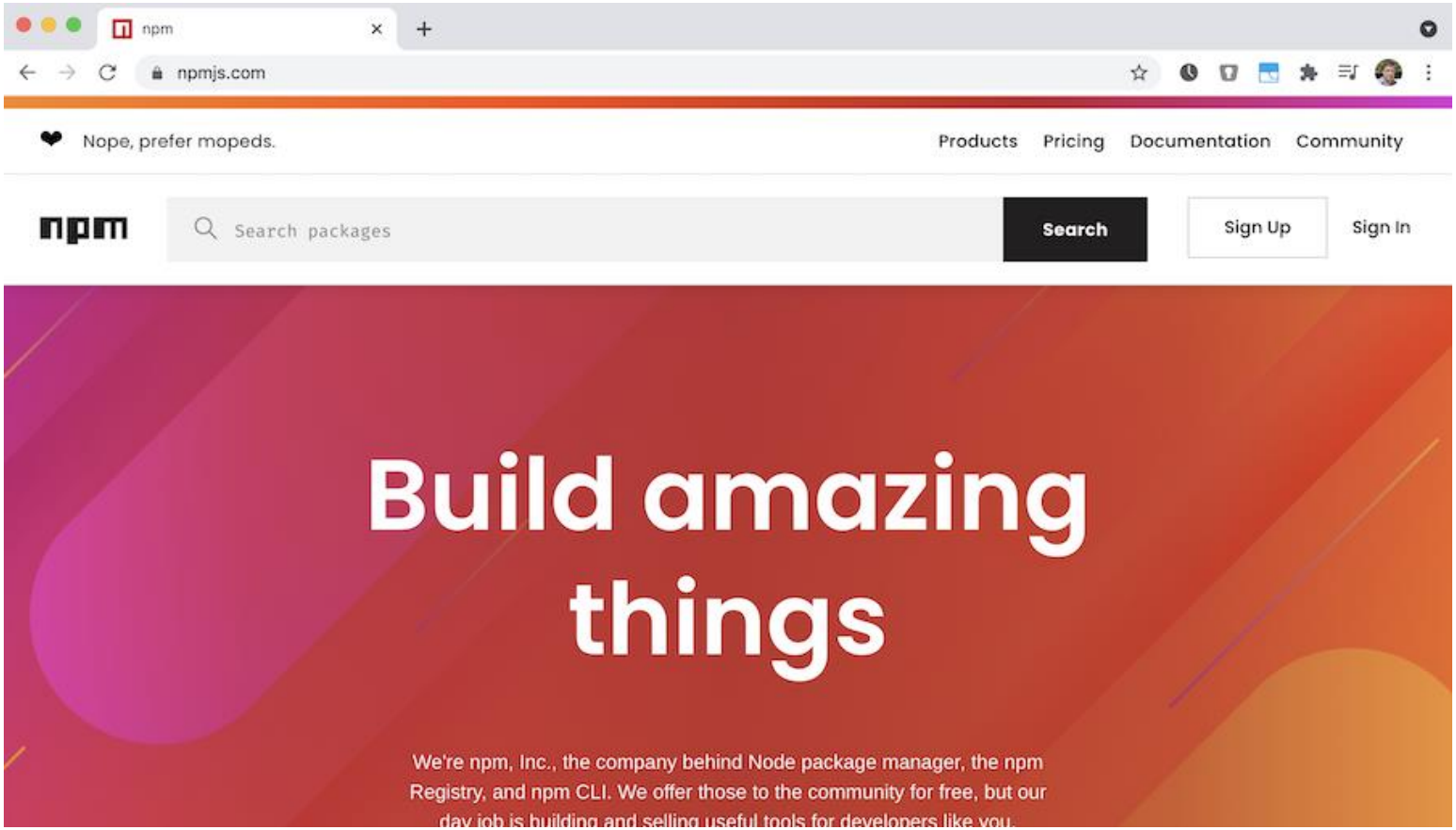
Destructuring

```
let options = {
  title: "Menu",
  width: 100,
  height: 200
};

// { sourceProperty: targetVariable }
let {width: w, height: h, title} = options;

// width -> w
// height -> h
// title -> title

alert(title);  // Menu
alert(w);      // 100
alert(h);      // 200
```

https://javascript.info/destructuring-assignment

MODULI TERZE PARTI

Import terze parti e npm



Comandi base npm

install

npm i <package>

uninstall

npm un <package>

update

npm up <package>

init

npm init

run

npm run <script>

https://gist.github.com/AvnerCohen/4051934

Versions

Code status	Stage	Rule	Example version
First release	New product	Start with 1.0.0	1.0.0
Backward compatible bug fixes	Patch release	Increment the third digit	1.0.1
Backward compatible new features	Minor release	Increment the middle digit and reset last digit to zero	1.1.0
Changes that break backward compatibility	Major release	Increment the first digit and reset middle and last digits to zero	2.0.0

update

- Patch releases: 1.0 or 1.0.x or ~1.0.4
- Minor releases: 1 or 1.x or ^1.0.4
- Major releases: * or x

```
"dependencies": {
  "my_dep": "^1.0.0",
  "another_dep": "~2.2.0"
},
```

Resolving and loading

- Risolvere il path e decidere il modulo da caricare

1. **Core Module**
2. Se path inizia con './' o '../' -> **Developer Module**
   - prima lo script con il nome
   - poi la folder con dentro index.js
3. Entra in modules_core e cerca gli **Installed Module**

LOAD DEI MODULI

IIFE : Immediately Invoked Function Expressions

- Le **IIFE** sono funzioni che si **eseguono subito dopo la dichiarazione**. In Node venivano (e a volte ancora vengono) usate per isolare codice ed evitare conflitti di variabili.

```
(function() {
  const messaggio = "Ciao dal modulo isolato!";
  console.log(messaggio);
})();
```

IIFE per wrapping

Prima di require() e module.exports, molti sviluppatori usavano pattern come questo:

```
const modulo = (function() {
  const segreto = "Valore interno";

  function mostra() {
    console.log("Segreto:", segreto);
  }

  return {
    mostra
  };
})();

module.exports = modulo;
```

CommonJS Wrapping

- **require**: funzione per importare moduli
- **module**: riferimento al modulo corrente
- **export**: riferimento a module.export
- **__filename**: path assoluto del modulo
- **__dirname**: path della dir del modulo

CommonJS Wrapping

```
(function exports require module __filename __dirname {
    // Module code lives here...
});
```

- **require**: funzione per importare moduli
- **module**: riferimento al modulo corrente
- **export**: riferimento a module.export
- **__filename**: path assoluto del modulo
- **__dirname**: path della dir del modulo

```
console.log(module.exports === exports); // true
```

Wapper function

```
(function (exports, require, module, __filename, __dirname) {
    const error = 'ERROR';
    const warning = 'WARNING';
    const info = 'INFO';

    function log(message, level = info) {
        console.log(`${level}: ${message}`);
    }

    module.exports.log = log;
    module.exports.error = error;
    module.exports.info = info;
    module.exports.warning = warning;
});
```

Esecuzione, exports e caching

1. Il codice del modulo viene eseguito
   - La funzione require torna gli exports

Esecuzione, exports e caching

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2. Il risultato dell'esecuzione è salvato nella cache
   - Viene restituito alle esecuzioni successive del modulo

Esecuzione, exports e caching

1. Il codice del modulo viene eseguito
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2. Il risultato dell'esecuzione è salvato nella cache
   - Viene restituito alle esecuzioni successive del modulo

```
// file: mioModulo.js
console.log('✅ Codice del modulo eseguito');
module.exports = { saluta: () => console.log('Ciao!') };
```

Esecuzione, exports e caching

1. Il codice del modulo viene eseguito
   - La funzione require torna gli exports

2. Il risultato dell'esecuzione è salvato nella cache
   - Viene restituito alle esecuzioni successive del modulo

```
// file: mioModulo.js
console.log('✅ Codice del modulo eseguito');
module.exports = { saluta: () => console.log('Ciao!') };
```

```
// file: main.js
const mioModulo1 = require('./mioModulo'); // Codice eseguito, exports restituito
mioModulo1.saluta();

const mioModulo2 = require('./mioModulo'); // ⚠️ Nessuna nuova esecuzione
mioModulo2.saluta();
```