



# **Corso di Progettazione di Applicazioni Web e Mobile**

# Hello!

## I am Diego Bonura

Mi occupo di:

- Frontend
- Backend
- Mobile
- IoT
- Ricerca e sviluppo

[diego@bonura.dev](mailto:diego@bonura.dev)

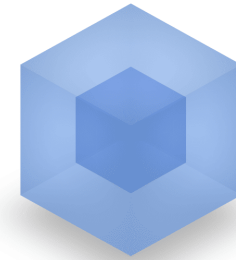
<https://medium.com/@diegobonura>



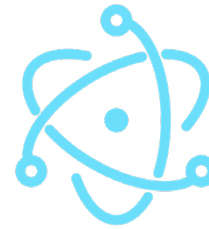
**LOCCIONI**



Cosa riconoscete?



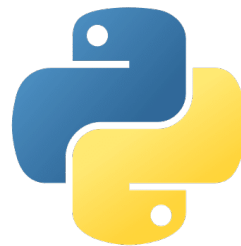
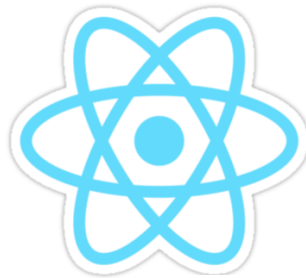
Express



Apache



Apache





# Programma

- Sviluppo web/mobile: di cosa si tratta
- Architettura di una applicazione mobile
- Protocolli
- Dalla prototipazione al deploy
- Sicurezza
- Testing
- ...





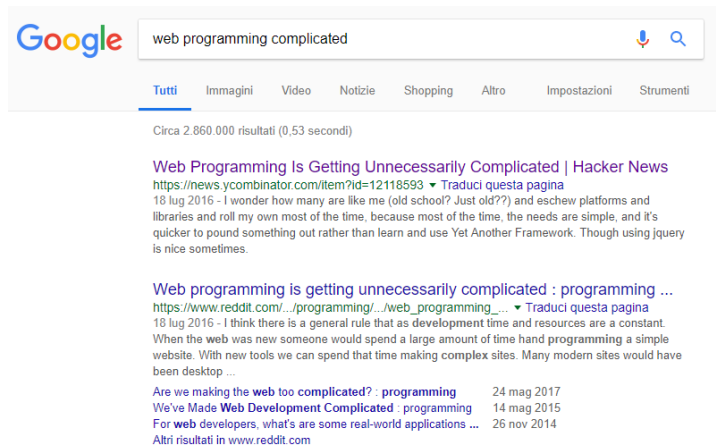
1.



# Web e Mobile development



“


# *Quanto è complesso sviluppare applicazioni web/mobile?*




Google   

[Tutti](#) [Immagini](#) [Video](#) [Notizie](#) [Shopping](#) [Altro](#) [Impostazioni](#) [Strumenti](#)

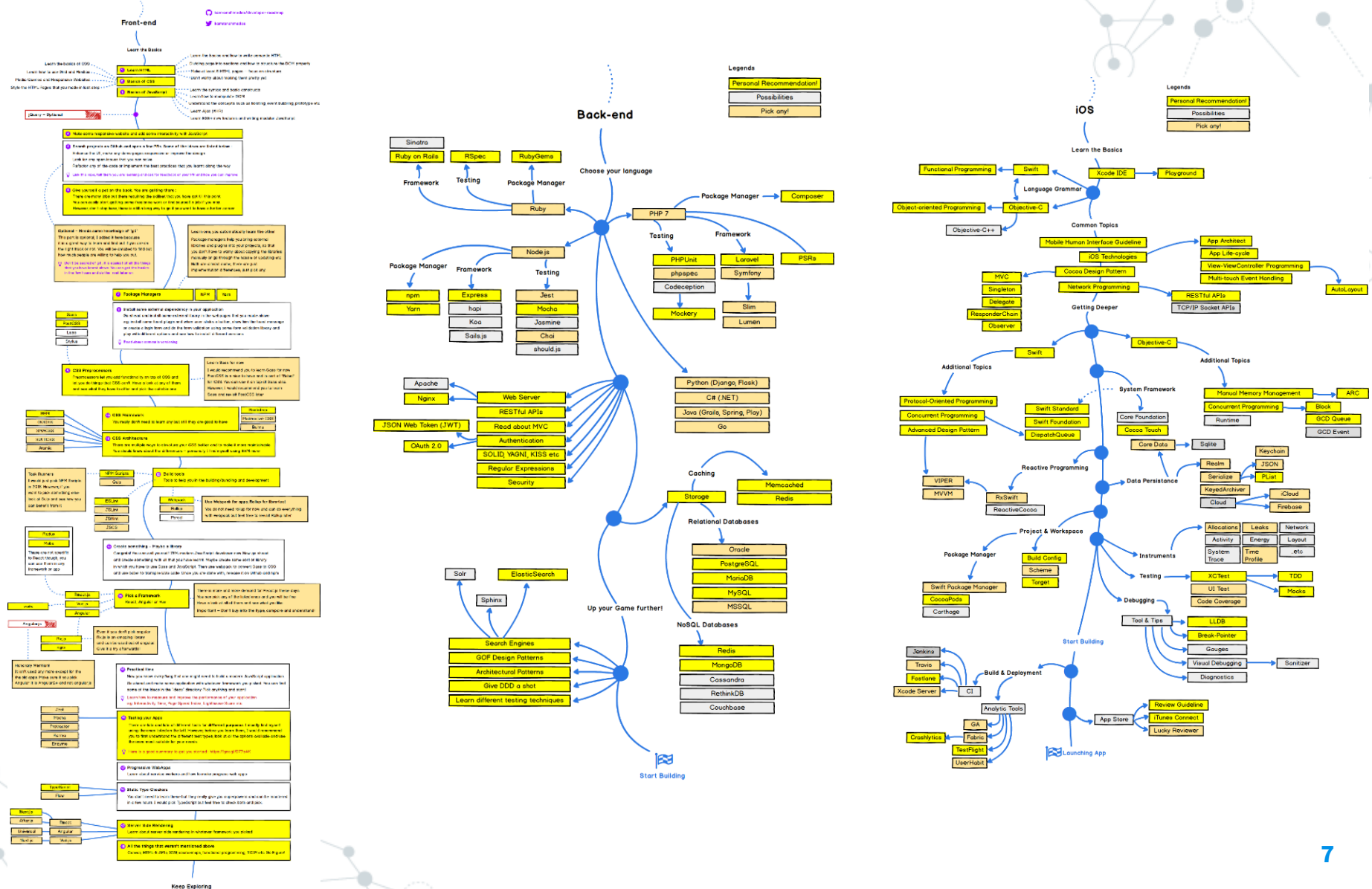
Circa 2.860.000 risultati (0,53 secondi)

**Web Programming Is Getting Unnecessarily Complicated | Hacker News**  
<https://news.ycombinator.com/item?id=12118593>  Traduci questa pagina  
18 lug 2016 - I wonder how many are like me (old school? Just old??) and eschew platforms and libraries and roll my own most of the time, because most of the time, the needs are simple, and it's quicker to pound something out rather than learn and use Yet Another Framework. Though using jquery is nice sometimes.

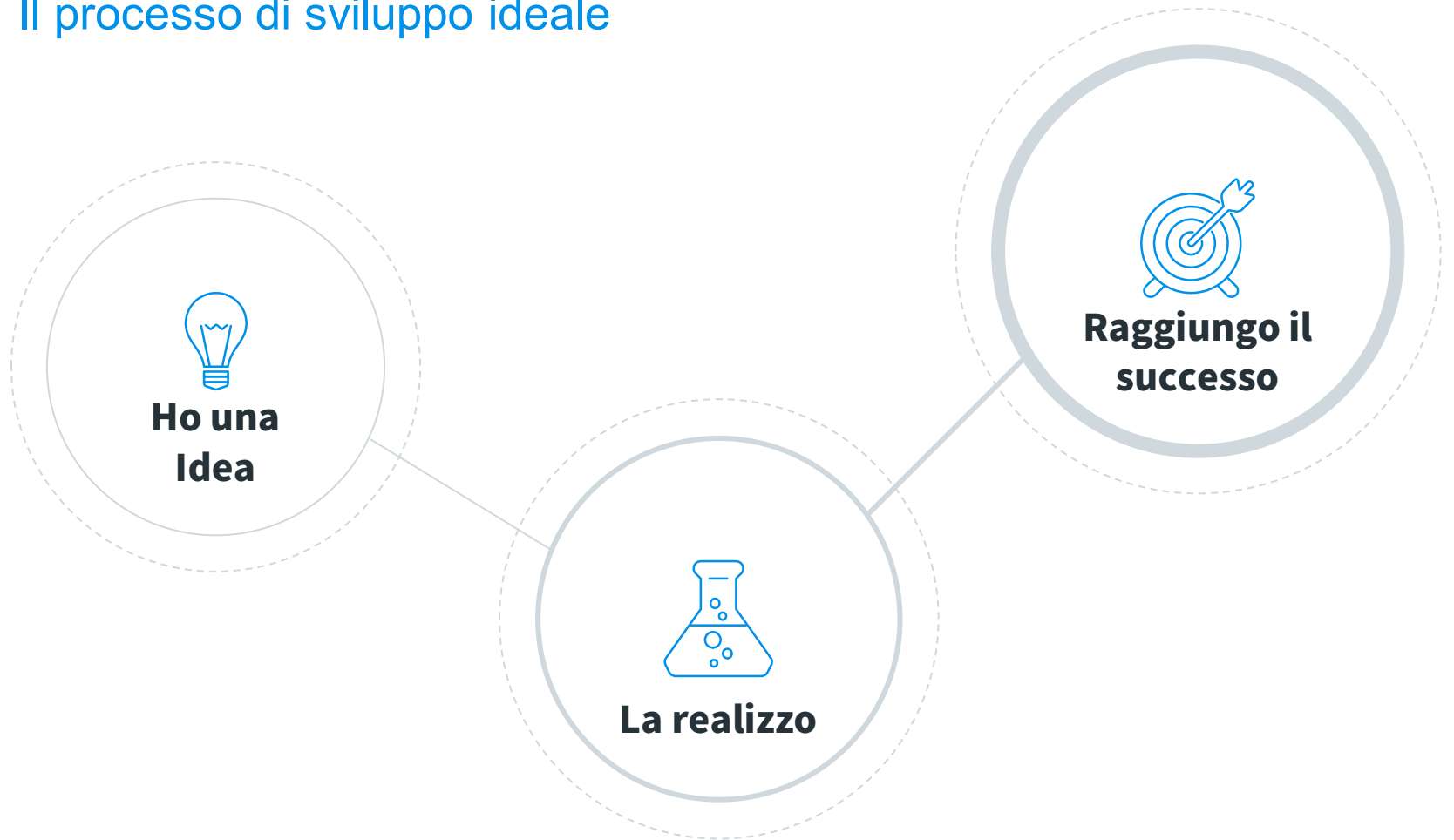
**Web programming is getting unnecessarily complicated : programming ...**  
[https://www.reddit.com/.../programming/.../web\\_programming...](https://www.reddit.com/.../programming/.../web_programming...)  Traduci questa pagina  
18 lug 2016 - I think there is a general rule that as development time and resources are a constant. When the web was new someone would spend a large amount of time hand programming a simple website. With new tools we can spend that time making complex sites. Many modern sites would have been desktop ...

Are we making the **web too complicated?** : programming 24 mag 2017  
We've Made **Web Development Complicated** : programming 14 mag 2015  
For **web developers**, what's are some real-world applications ... 26 nov 2014  
[Altri risultati in www.reddit.com](#)

# Roadmap to become.....



## Il processo di sviluppo ideale



# Il processo di sviluppo reale (semplificato)

## Idea

- Strategia
- Monetizzazione

## Analisi

- Requirements
- Team
- Roadmap

## Design

- UserExperience
- UserInterface

## Mock

- Requirements
- Roadmap
- Realizzazione
- Feedback

## Sviluppo

- Metodologia
- Backend
- Frontend
- Amministrazione

## Testing

- Validazione requirements
- Beta phase
- Analytics

## Deploy

- Cloud
- Store

## Supporto

# Use Cases (semplificato)



## • Per l'utente:

- Facile da rintracciare
- Facile da installare
- Facile da usare
- Riconoscibile (con una propria identità)
- Sicura
- Stabile
- Veloce
- Poco energivora
- Leggera nei trasferimenti
- Con notifiche
- Facile da condividere
- Backup automatico



## • Per lo sviluppatore:

- Facile da mantenere
- Facile da aggiornare
- Che sia scalabile al crescere degli utenti
- Che sia economica (cloud/server)
- Sicura
- Stabile
- Che rispetti le linee guida degli store
- A/B Test facile da integrare
- Logger e altri servizi facili da integrare



## • Per l'amministratore:

- Facile da usare
- Facile da analizzare
- Facile da mantenere



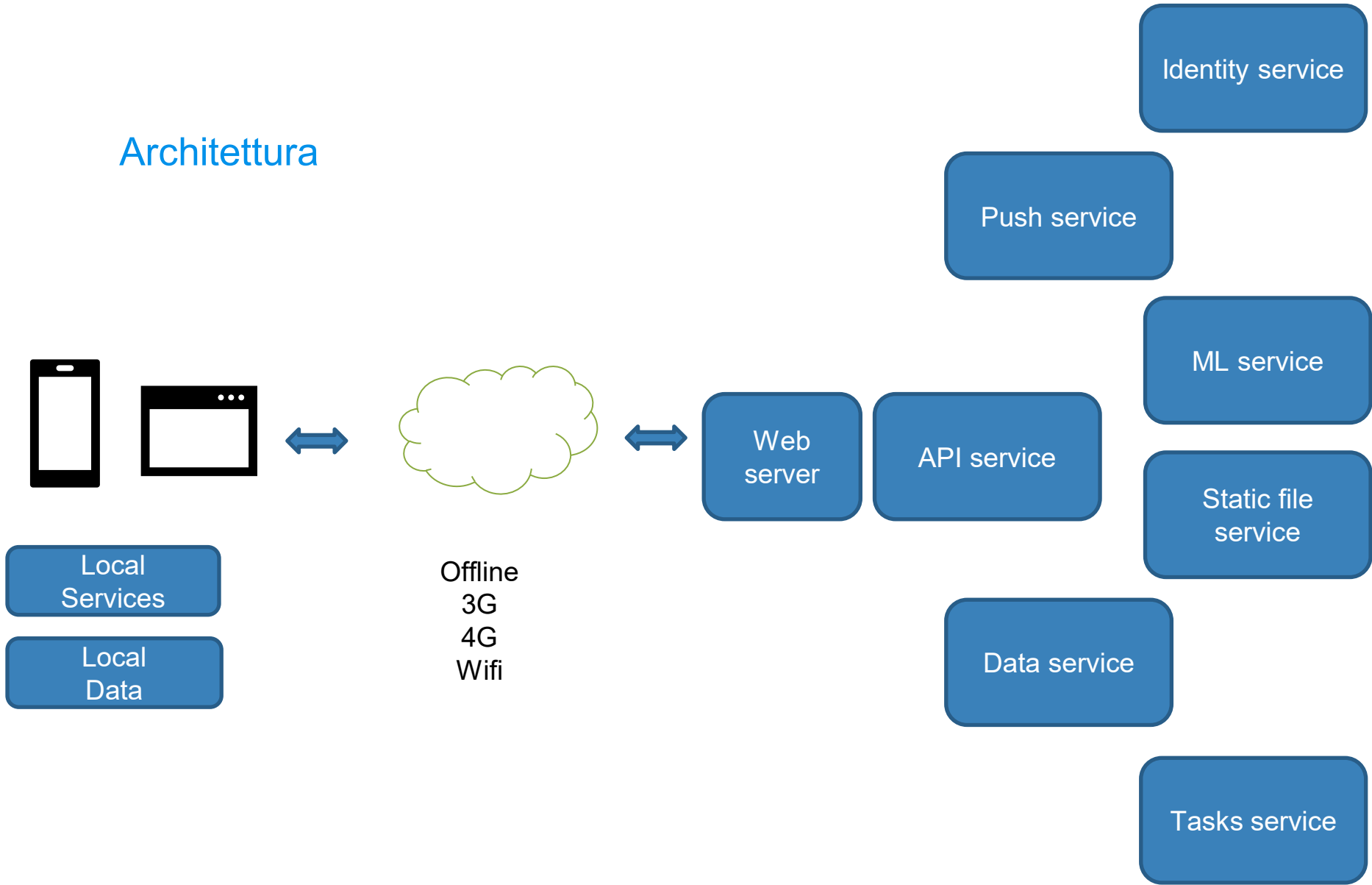
## • Per il customer service

- Facile da usare

A decorative network diagram in the top-left corner, consisting of various sized circles (nodes) connected by thin lines (edges). Some nodes are solid grey, while others are hollow with a grey outline. The connections form a complex, branching structure.

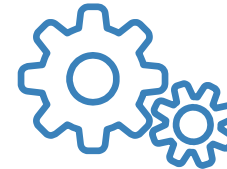
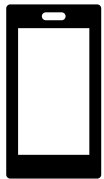
# 2. Architettura

# Architettura

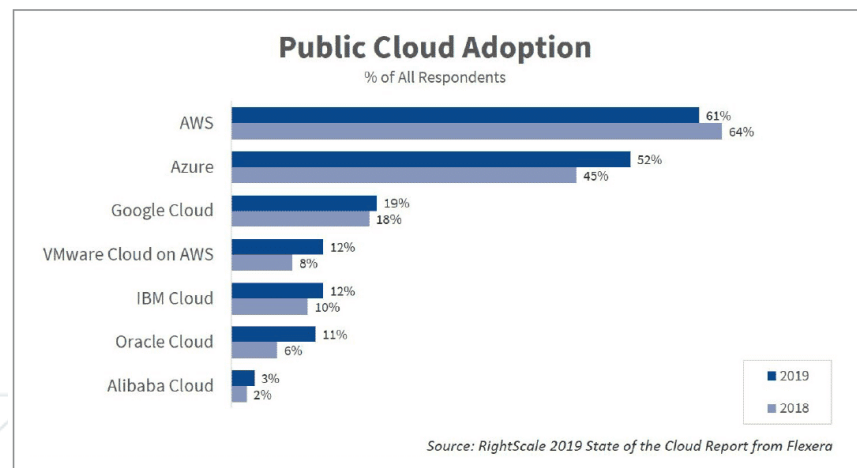
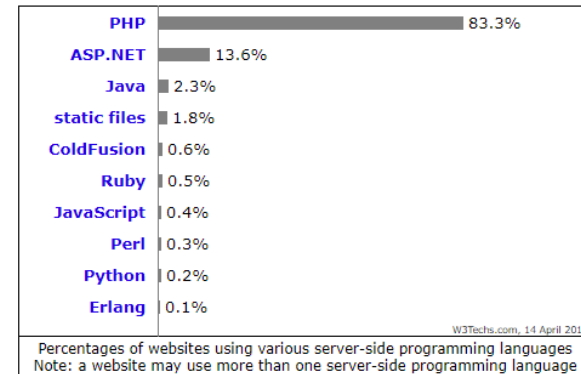
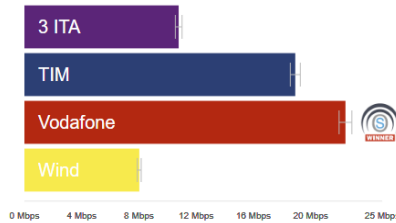




# Diffusione tecnologie



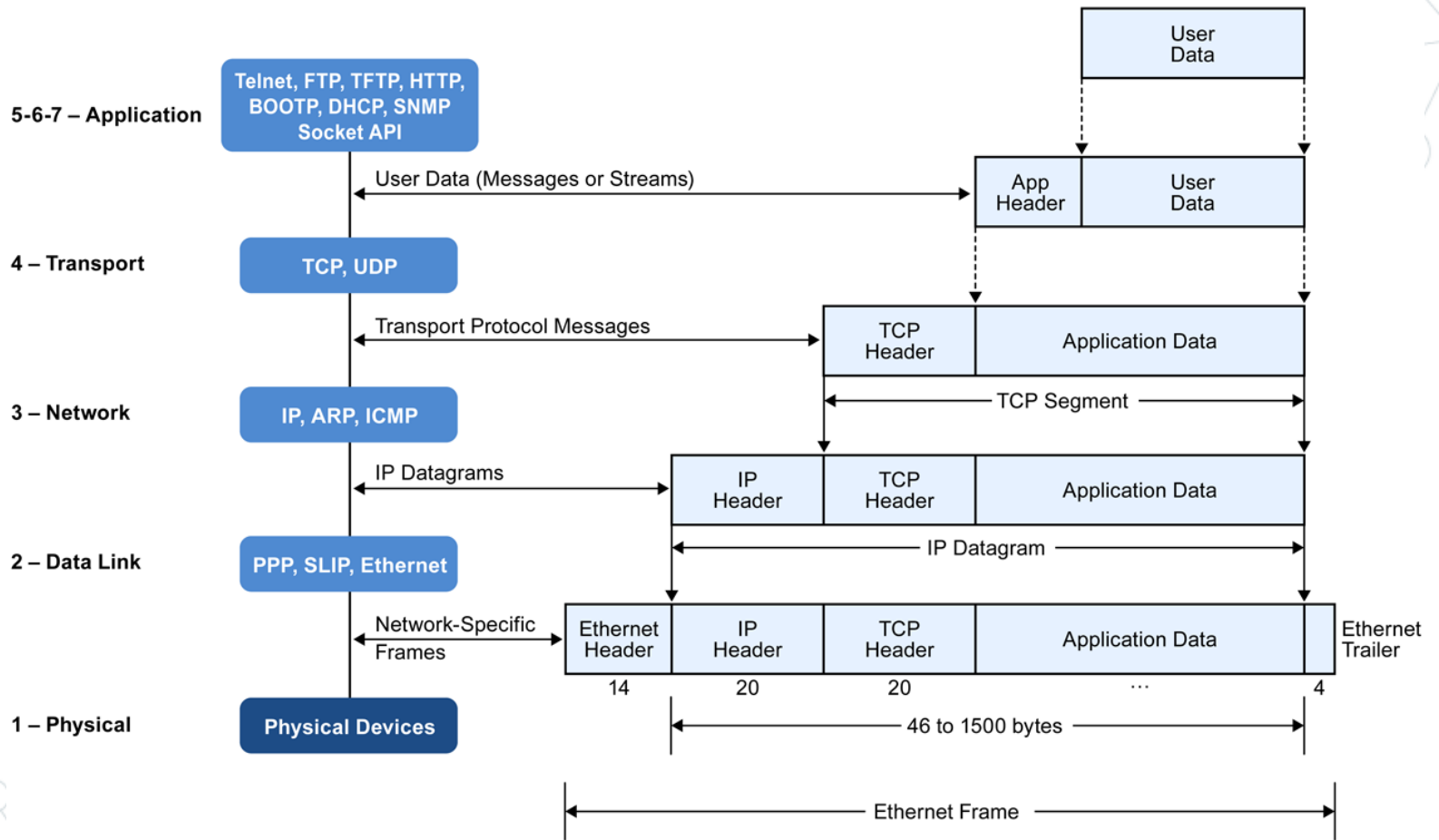
Download Speed: Overall OpenSignal



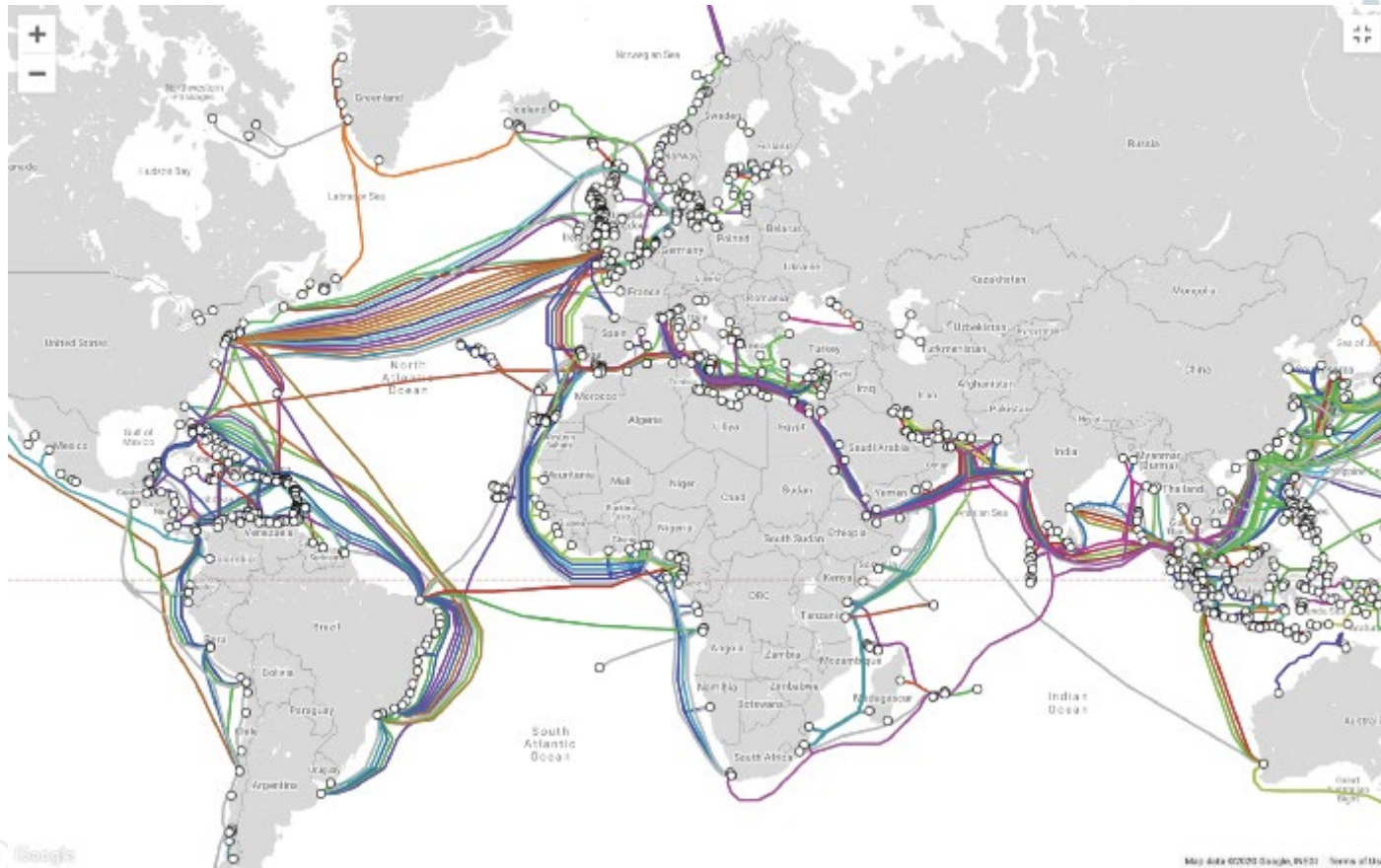
# Protocolli



# Modello ISO/OSI



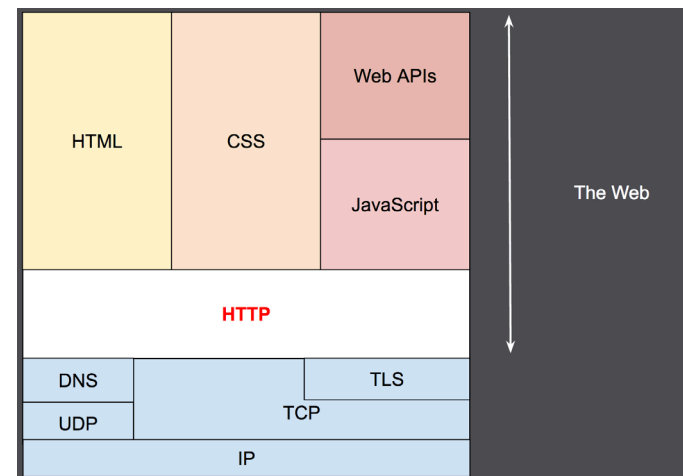
# Che giro!



<https://betterprogramming.pub/understand-the-flow-of-a-http-request-1a268ec193f0>

# HyperText Transfer Protocol (HTTP - rfc2616)

- Protocollo a livello applicativo
- A livello di trasporto si basa sul TCP (o TLS)
- Request/Response (Client / Server)
- Url composta da http://host:port/path/file
- Metodo: GET/POST/PUT/DELETE/OPTIONS..
- Stato nella risposta: 200/300/400/404/500
- Header di request e di response
- Gestione cookie
- Diversi content-type (html/text/image/json/xml)



# HyperText Transfer Protocol

(1) User issues URL from a browser  
http://host:port/path/file



(5) Browser formats the response and displays

**Client** (Browser)

(2) Browser sends a request message

```
GET URL HTTP/1.1  
Host: host:port  
.....  
.....
```

(4) Server returns a response message

```
HTTP/1.1 200 OK  
.....  
.....
```

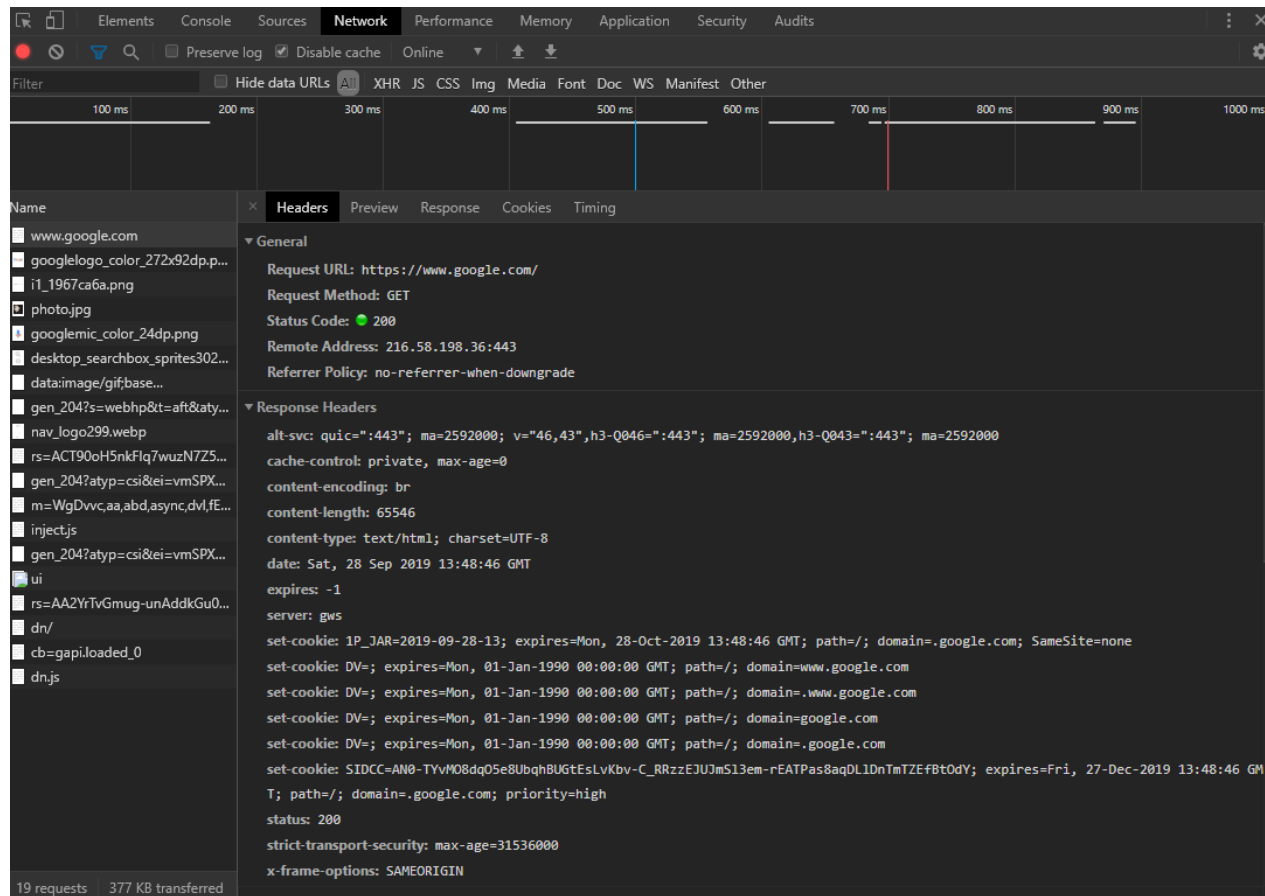
**HTTP** (Over TCP/IP)

(3) Server maps the *URL* to a file or program under the document directory.

**Server** (@ *host:port*)

# HyperText Transfer Protocol

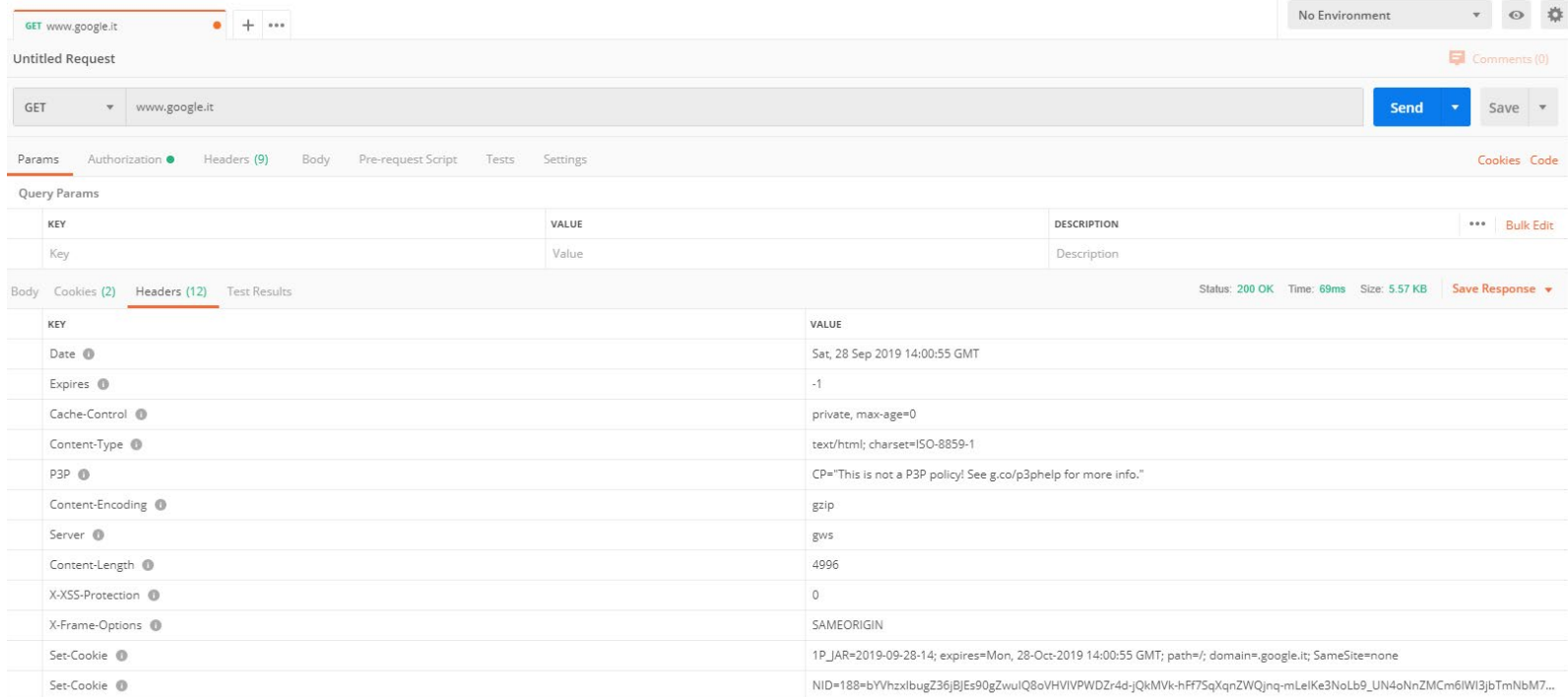
Studiare:  
Headers – Metodi - Cookie – Status Code - Timing



The screenshot shows the Chrome DevTools Network tab with the 'Headers' sub-tab selected. The request is a GET to `https://www.google.com/` with a status code of 200. The response headers are as follows:

```
alt-svc: quic=":443"; ma=2592000; v="46,43",h3-Q046=":443"; ma=2592000,h3-Q043=":443"; ma=2592000
cache-control: private, max-age=0
content-encoding: br
content-length: 65546
content-type: text/html; charset=UTF-8
date: Sat, 28 Sep 2019 13:48:46 GMT
expires: -1
server: gws
set-cookie: 1P_JAR=2019-09-28-13; expires=Mon, 28-Oct-2019 13:48:46 GMT; path=/; domain=.google.com; SameSite=none
set-cookie: DV=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=www.google.com
set-cookie: DV=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=.www.google.com
set-cookie: DV=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=google.com
set-cookie: DV=; expires=Mon, 01-Jan-1990 00:00:00 GMT; path=/; domain=.google.com
set-cookie: SIDCC=AN0-TYVM08dq05e8UubqhBUGtEslvKbv-C_RRzzEJU7mS13em-rEATPas8aqDL1DnTmTZEfBt0dY; expires=Fri, 27-Dec-2019 13:48:46 GMT; path=/; domain=.google.com; priority=high
status: 200
strict-transport-security: max-age=31536000
x-frame-options: SAMEORIGIN
```

# HyperText Transfer Protocol



The screenshot displays the 'Headers' tab of a web browser's developer tools. The request is a GET to www.google.it, which returned a 200 OK status. The response headers are as follows:

KEY	VALUE
Date	Sat, 28 Sep 2019 14:00:55 GMT
Expires	-1
Cache-Control	private, max-age=0
Content-Type	text/html; charset=ISO-8859-1
P3P	CP="This is not a P3P policy! See g.co/p3phelp for more info."
Content-Encoding	gzip
Server	gws
Content-Length	4996
X-XSS-Protection	0
X-Frame-Options	SAMEORIGIN
Set-Cookie	1P_JAR=2019-09-28-14; expires=Mon, 28-Oct-2019 14:00:55 GMT; path=/; domain=.google.it; SameSite=none
Set-Cookie	NID=188=bYVhzxIbugZ36jBJEs90gZwulQ8oVHVIVPWDzr4d-JQkMWk-hFF75qXqnZWQjmq-mLeIKe3NoLb9_UN4oNnZMCm6fWl3jbTmNbM7...



# HyperText Transfer Protocol

Limiti del protocollo:

- Una connessione per request/response
- Mancanza di gestione delle priorità su connessioni multiple
- Bassa compressione (no header compression)

Es: Apache Web Server Settings

## Concurrent Connections

By default apache2 is configured to support 150 concurrent connections. This forces all parallel requests beyond that limit to wait. Especially if, for example, active sync clients maintain a permanent connection for push events to arrive.

This is an example configuration to provide 8000 concurrent connections.

```
<IfModule mpm_worker_module>
  ServerLimit          250
  StartServers         10
  MinSpareThreads     75
  MaxSpareThreads     250
  ThreadLimit         64
  ThreadsPerChild     32
  MaxRequestWorkers   8000
  MaxConnectionsPerChild 10000
</IfModule>
```

Browsers:

Version	Maximum connections
Internet Explorer® 7.0	2
Internet Explorer 8.0 and 9.0	6
Internet Explorer 10.0	8
Internet Explorer 11.0	13
Firefox®	6
Chrome™	6
Safari®	6
Opera®	6
iOS®	6
Android™	6

# HTTP2 - rfc7540

## Multiplexing

Upwork

HTTP 1.1

**3** TCP CONNECTIONS



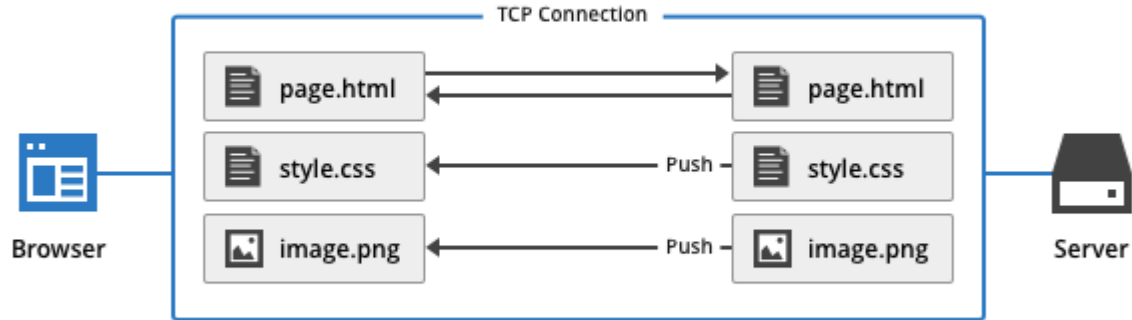
HTTP/2

**1** TCP CONNECTION

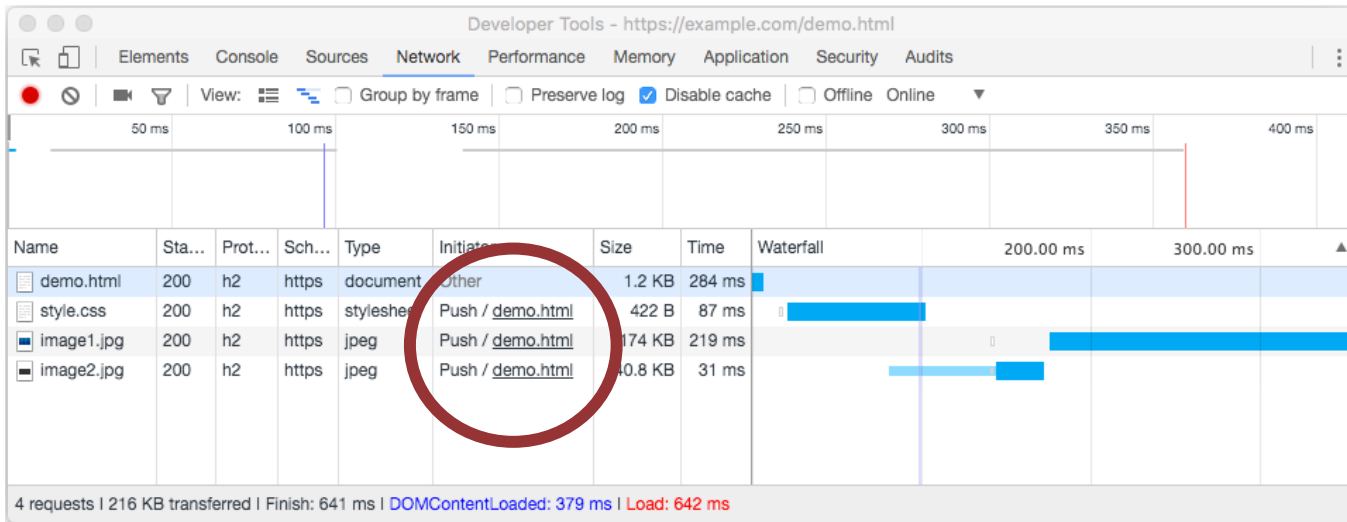


# HTTP2

## HTTP/2 (With Server Push)

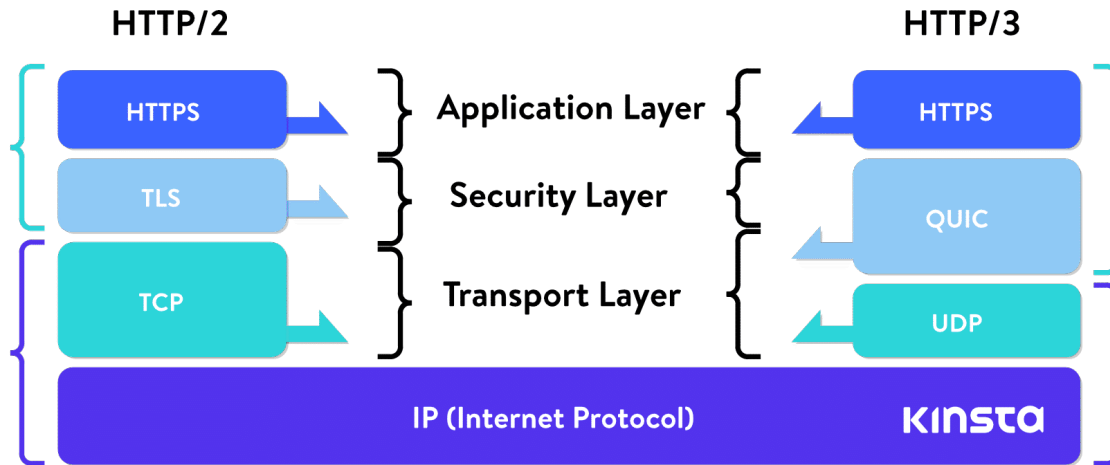


Single TCP Connection, Single HTTP Request

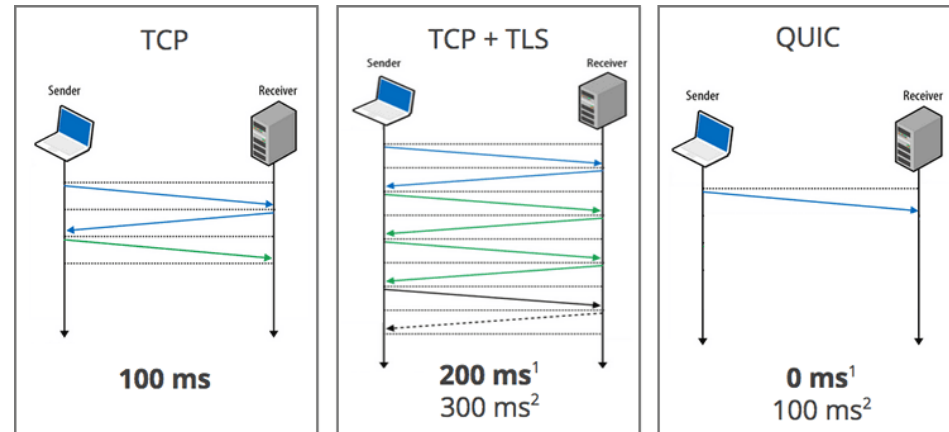


<https://http2.akamai.com/demo/http2-lab.html>

# HTTP3



HTTP/3 è la terza versione dell'Hypertext Transfer Protocol (HTTP), già noto come HTTP-over-QUIC. QUIC (Quick UDP Internet Connections) è stato inizialmente sviluppato da Google ed è il successore di HTTP/2. Aziende come Google e Facebook stanno già utilizzando QUIC per velocizzare il web.

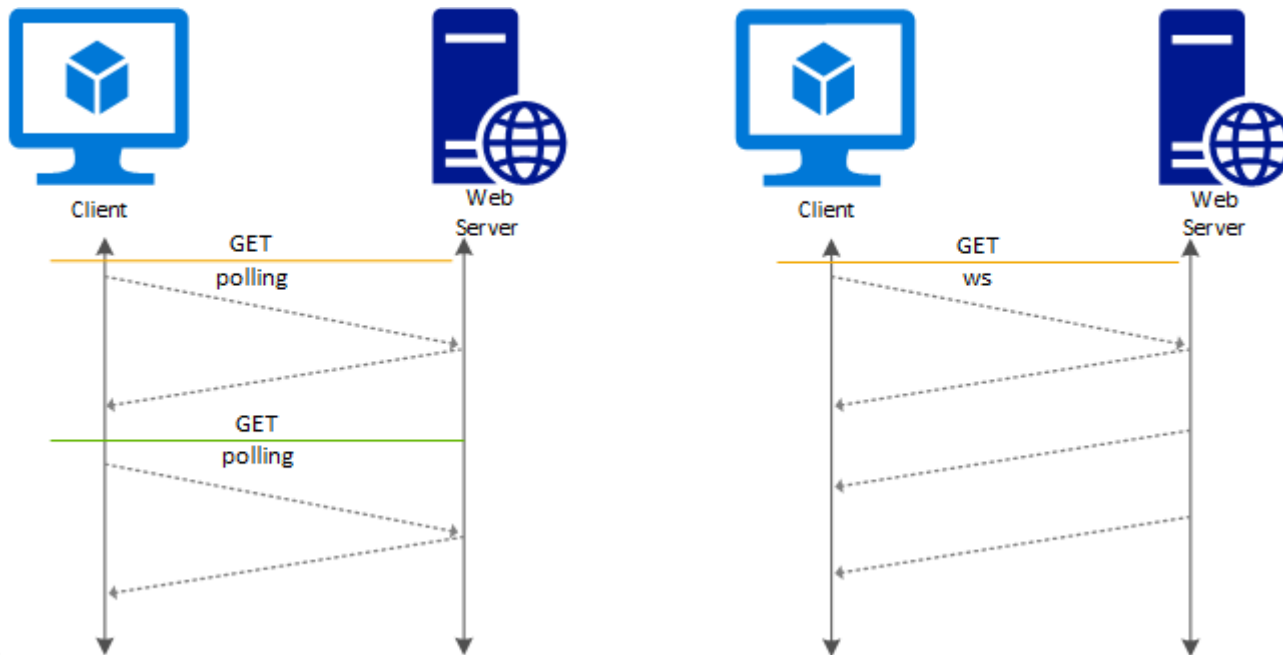


<https://kinsta.com/it/blog/http3/>  
<https://www.evemilano.com/protocolli-http/>

# WebSocket - rfc6455

Limiti del protocollo:

- Primo handshake su http
- Se tutto va bene il protocollo della connessione passa da http a websocket (usando la connessione Tcp precedentemente aperta dalla prima connessione http)
- A questo punto rimane solo il protocollo websocket
- Scambio messaggi bidirezionale



# HyperText Markup Language



# Html - rfc1866 rfc2854

## World Wide Web

The WorldWideWeb (W3) is a wide-area [hypermedia](#) information retrieval initiative aiming to give universal access to a large universe

Everything there is online about W3 is linked directly or indirectly to this document, including an [executive summary](#) of the project, [N](#)

### [What's out there?](#)

Pointers to the world's online information, [subjects](#) , [W3 servers](#) , etc.

### [Help](#)

on the browser you are using

### [Software Products](#)

A list of W3 project components and their current state. (e.g. [Line Mode](#) ,[X11 Viola](#) , [NeXTStep](#) , [Servers](#) , [Tools](#) , [Mail robot](#) , [Lib](#)

### [Technical](#)

Details of protocols, formats, program internals etc

### [Bibliography](#)

Paper documentation on W3 and references.

### [People](#)

A list of some people involved in the project.

### [History](#)

A summary of the history of the project.

### [How can I help ?](#)

If you would like to support the web..

### [Getting code](#)

Getting the code by [anonymous FTP](#) , etc.

In March 1989, Berners-Lee gave managers at CERN a proposal for an information management system that used hypertext to link documents on different computers that were connected to the Internet. (Hypertext, a term coined in 1963, allows a person to get a document or piece of content by clicking on a coded word or phrase.)



# Html - rfc1866 rfc2854

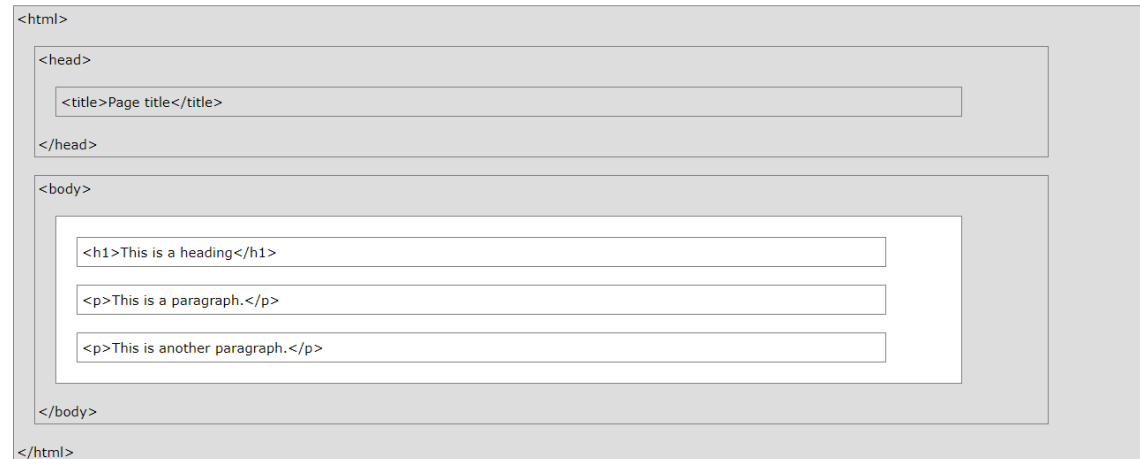
```
<!DOCTYPE html>
<html lang="en">

<meta charset="utf-8">
<title>Page Title</title>

<body>
  <h1>This is a Heading</h1>
  <p>This is a paragraph.</p>
  <p>This is another paragraph.</p>
</body>

</html>
```

HTML elements are the building blocks of HTML pages





## Html - rfc1866 rfc2854

```
<div style="background-color:lightblue">  
  <h3>This is a heading</h3>  
  <p>This is a paragraph.</p>  
</div>
```

```
<a href="https://www.w3schools.com">This is  
a link</a>
```

```
id</b> ="table01"                                      |
| class       | <p <b>class</b> ="normal">                                       |
| style       | <p <b>style</b> ="font-size:16px">                               |
| data-       | <div <b>data-id</b> ="500">                                      |
| onclick     | <input <b>onclick</b> ="myFunction()">                           |
| onmouseover | <a <b>onmouseover</b> ="this.setAttribute('style','color:red')"> |

# CSS - Cascading Style Sheets - rfc7993

CSS



CSS describes how **HTML** elements are to be **displayed**

```
<style>
```

```
body {background-color:lightblue; text-align:center;}  
h1 {color:blue; font-size:40px;}  
p {font-family:verdana; font-size:20px;}
```

```
</style>
```

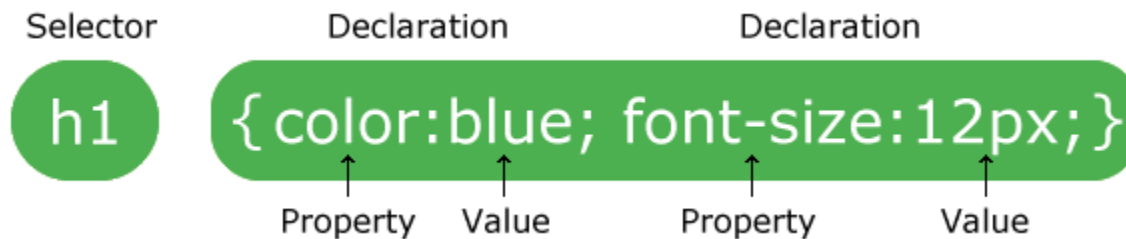
## My First CSS Heading

My first CSS paragraph.

[https://www.w3schools.com/whatis/whatis\\_css.asp](https://www.w3schools.com/whatis/whatis_css.asp)

# CSS - Cascading Style Sheets - rfc7993

A CSS rule consists of a **selector** and a **declaration** block:



[https://www.w3schools.com/cssref/css\\_selectors.asp](https://www.w3schools.com/cssref/css_selectors.asp)

<https://www.w3schools.com/cssref/trysel.asp>

# CSS - Cascading Style Sheets - rfc7993

## Bootstrap

Build responsive, mobile-first projects on the web with the world's most popular front-end component library.

Bootstrap is an open source toolkit for developing with HTML, CSS, and JS. Quickly prototype your ideas or build your entire app with our Sass variables and mixins, responsive grid system, extensive prebuilt components, and powerful plugins built on jQuery.

Get started

Download

Currently v4.3.1



```
<button type="button" class="btn btn-primary">Primary</button>
<button type="button" class="btn btn-secondary">Secondary</button>
<button type="button" class="btn btn-success">Success</button>
<button type="button" class="btn btn-danger">Danger</button>
<button type="button" class="btn btn-warning">Warning</button>
<button type="button" class="btn btn-info">Info</button>
<button type="button" class="btn btn-light">Light</button>
<button type="button" class="btn btn-dark">Dark</button>

<button type="button" class="btn btn-link">Link</button>
```

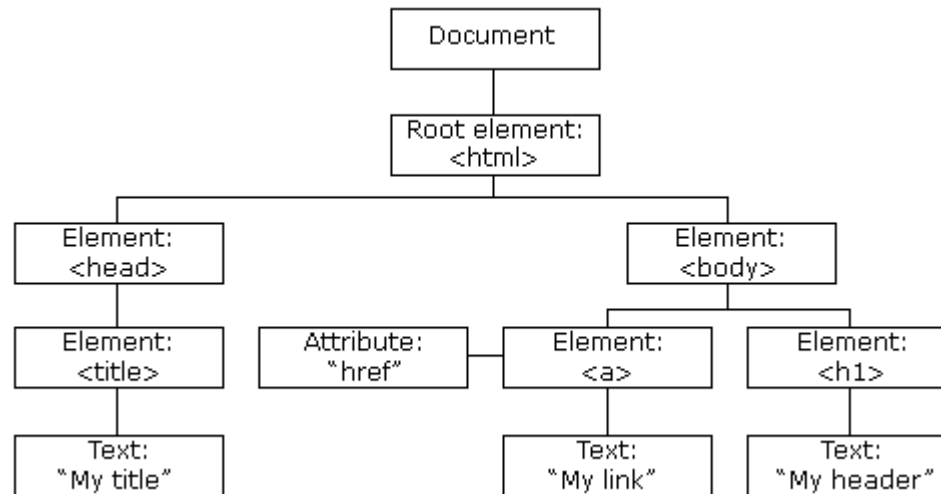
Copy



# HTML e DOM

The HTML DOM (Document Object Model)

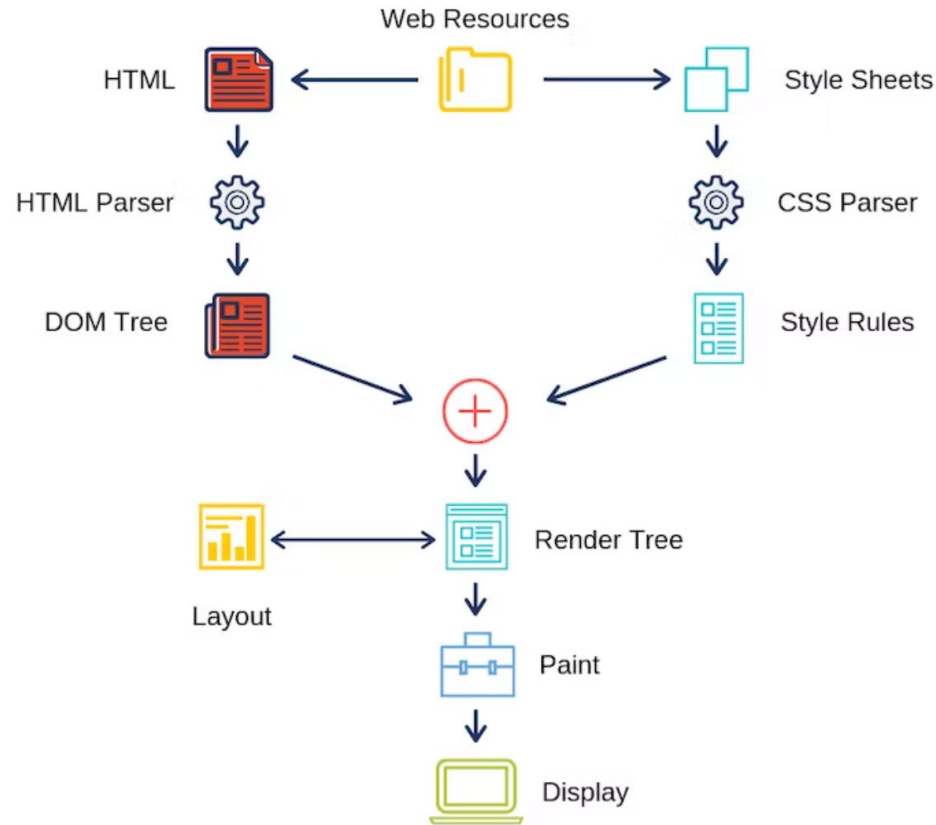
When a web page is loaded, the browser creates a **D**ocument **O**bject **M**odel of the page.



With the HTML DOM, JavaScript can access and change all the elements of an HTML document.

[https://www.w3schools.com/whatis/whatis\\_htmlDOM.asp](https://www.w3schools.com/whatis/whatis_htmlDOM.asp)

# How Do Web Browsers Work?



<https://hackernoon.com/how-do-web-browsers-work-40cefd2cb1e1>

# Security

## SQL Injection



## Cosa è:

**SQL injection** è una tecnica di *code injection* dove si inietta del codice SQL

```
# Define POST variables
uname = request.POST['username']
passwd = request.POST['password']

# SQL query vulnerable to SQLi
sql = "SELECT id FROM users WHERE username='" + uname + "' AND password='" + passwd + "'"

# Execute the SQL statement
database.execute(sql)
```

<https://www.acunetix.com/websitesecurity/sql-injection/>



## Come si combatte?

Semplicemente usando: **prepared statements and parameterized queries**

```
$stmt = $dbConnection->prepare('SELECT * FROM employees WHERE name = ?');  
$stmt->bind_param('s', $name);
```

Oppure pulendo tutti gli input:

```
mysqli_real_escape_string ( mysqli $link , string $escapestr ) : string
```

This function is used to create a legal SQL string that you can use in an SQL statement. The given string is encoded to an escaped SQL string, taking into account the current character set of the connection.

```
$unsafe_variable = $_POST["user-input"];  
$safe_variable = mysqli_real_escape_string($unsafe_variable);  
mysqli_query("INSERT INTO table (column) VALUES (" . $safe_variable . ")");
```

# Javascript

JavaScript was initially created to “make web pages alive”.

Scripts are provided and executed as plain text. They don't need special preparation or compilation to run.

```
<!DOCTYPE html>
<html>
<body>

<h2>JavaScript Statements</h2>

<p>A <b>JavaScript program</b> is a list of <b>statements</b> to be executed by a computer.</p>

<p id="demo"></p>

<script>
var x, y, z; // Declare 3 variables
x = 5;      // Assign the value 5 to x
y = 6;      // Assign the value 6 to y
z = x + y;  // Assign the sum of x and y to z

document.getElementById("demo").innerHTML =
"The value of z is " + z + ".";
</script>

</body>
</html>
```

[https://www.w3schools.com/js/js\\_examples.asp](https://www.w3schools.com/js/js_examples.asp)

# Javascript

## Javascript è un linguaggio debolmente tipizzato

<https://hacks.mozilla.org/2017/02/a-crash-course-in-just-in-time-jit-compilers/>



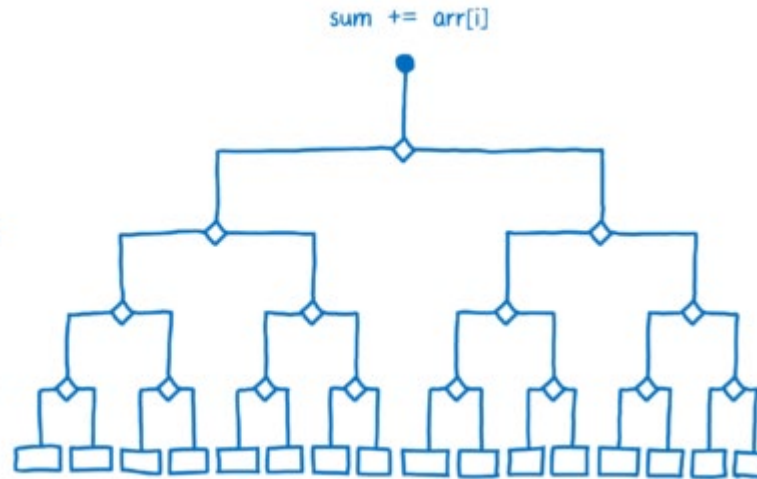
```
function arraySum(arr) {  
  var sum = 0;  
  for (var i = 0; i < arr.length; i++) {  
    sum += arr[i];  
  }  
}
```

is sum an int?

is arr an array?

is i an int?

is arr[i] an int?



# Javascript



(SpiderMonkey)

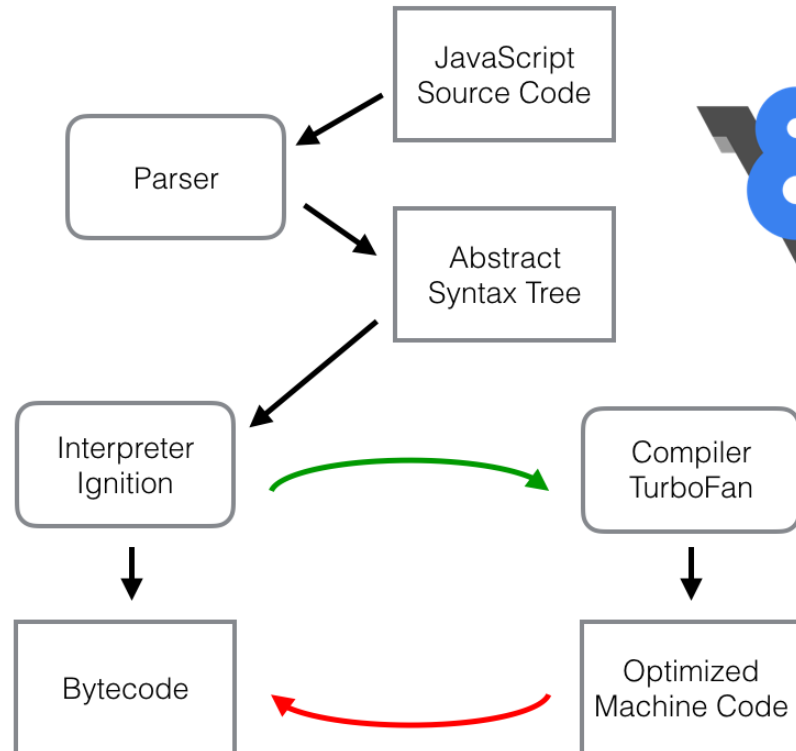


(Nitro)

1. The engine (embedded if it's a browser reads ("parses") the script.

2. Then it converts ("compiles") the script the machine language.

3. And then the machine code runs, pretty fast.



# Javascript



Machine code

```
// x86_64 machine code  
movl rbx,[rax+0x1b]  
REX.W movq r10,0x100000000  
REX.W cmpq r10,rbx  
jnc 0x30d119104275 <+0x55>  
REX.W movq rdx,0x100000000  
call 0x30d118e843e0 (Abort)  
int3laddl rbx,0x1  
...
```

Bytecode

```
// V8 bytecode  
LdaSmi [1]  
Star r0  
LdaNamedProperty a0, [0], [4]  
Add r0, [6]
```

High Level Language

```
// JavaScript  
let result = 1 + obj.x;
```



Best for humans

Best for machines



@fhinkel



# Javascript

JavaScript is always synchronous and single-threaded. If you're executing a JavaScript block of code on a page then no other JavaScript on that page will currently be executed.



synchronous, single thread of control



synchronous, two threads of control



asynchronous



# Javascript – Callback and Promise

One approach to asynchronous programming is to make functions that perform a slow action take an extra argument, a *callback function*. The action is started, and when it finishes, the callback function is called with the result.

```
setTimeout(() => console.log("Tick"), 500);
```

A *promise* is an asynchronous action that may complete at some point and produce a value. It is able to notify anyone who is interested when its value is available.

```
let fifteen = Promise.resolve(15);  
fifteen.then(value => console.log(`Got ${value}`));
```

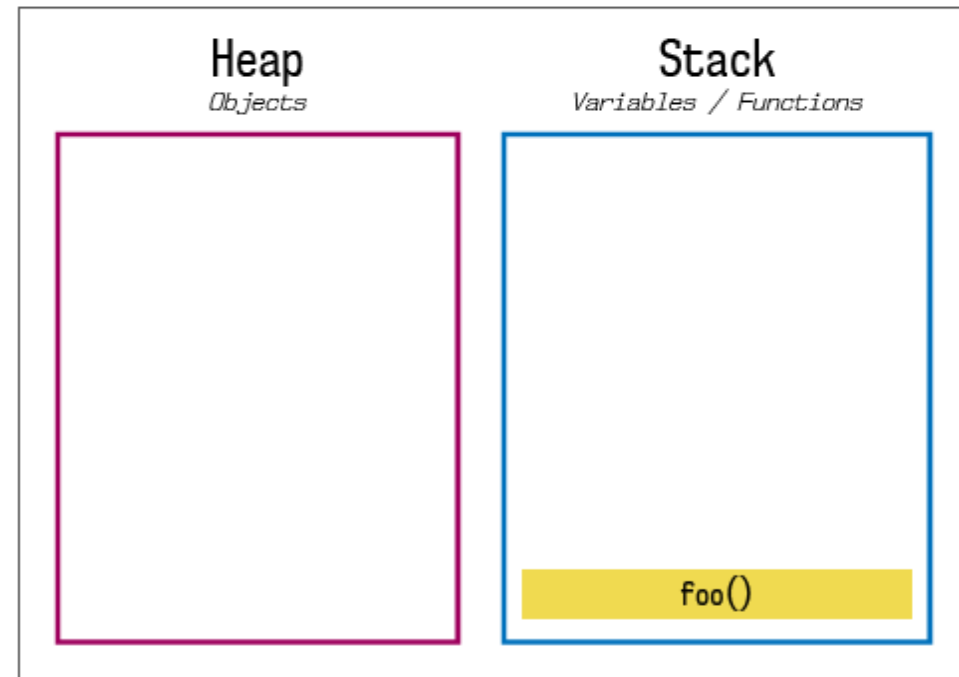


# Javascript – Callback and Promise

## Javascript Program

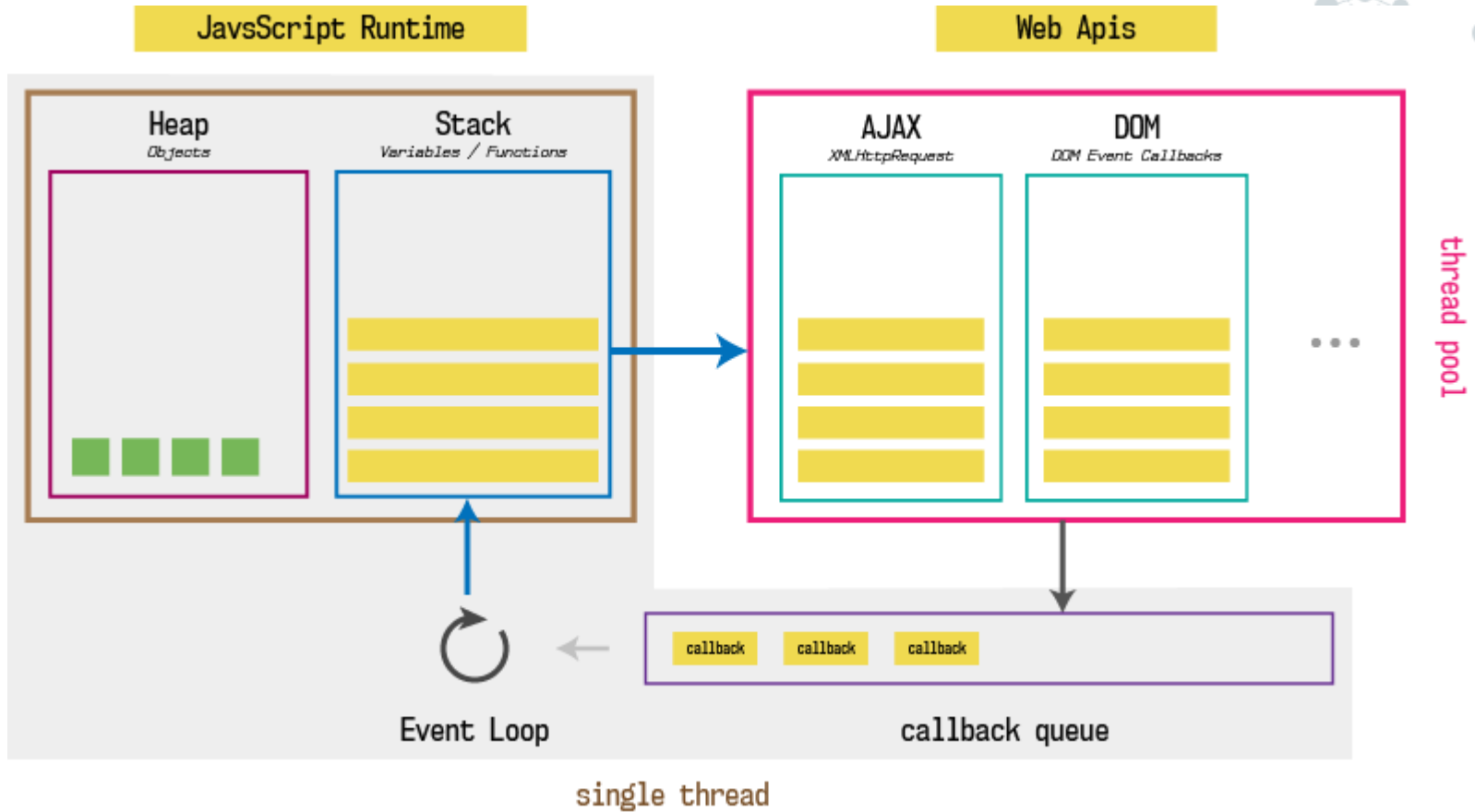
```
function baz(){  
  console.log('Hello from baz');  
}  
  
function bar() {  
  baz();  
}  
  
function foo() {  
  bar();  
}  
  
foo();
```

## Javascript Runtime





# Javascript – Callback and Promise



# Javascript – Callback and Promise

The screenshot shows the Loupe web browser interface. On the left is a code editor with the following JavaScript code:

```
1  
2  
3 function printHello() {  
4   console.log('Hello from baz');  
5 }  
6  
7 function baz() {  
8   setTimeout(printHello, 3000);  
9 }  
10  
11 function bar() {  
12   baz();  
13 }  
14  
15 function foo() {  
16   bar();  
17 }  
18  
19 foo();
```

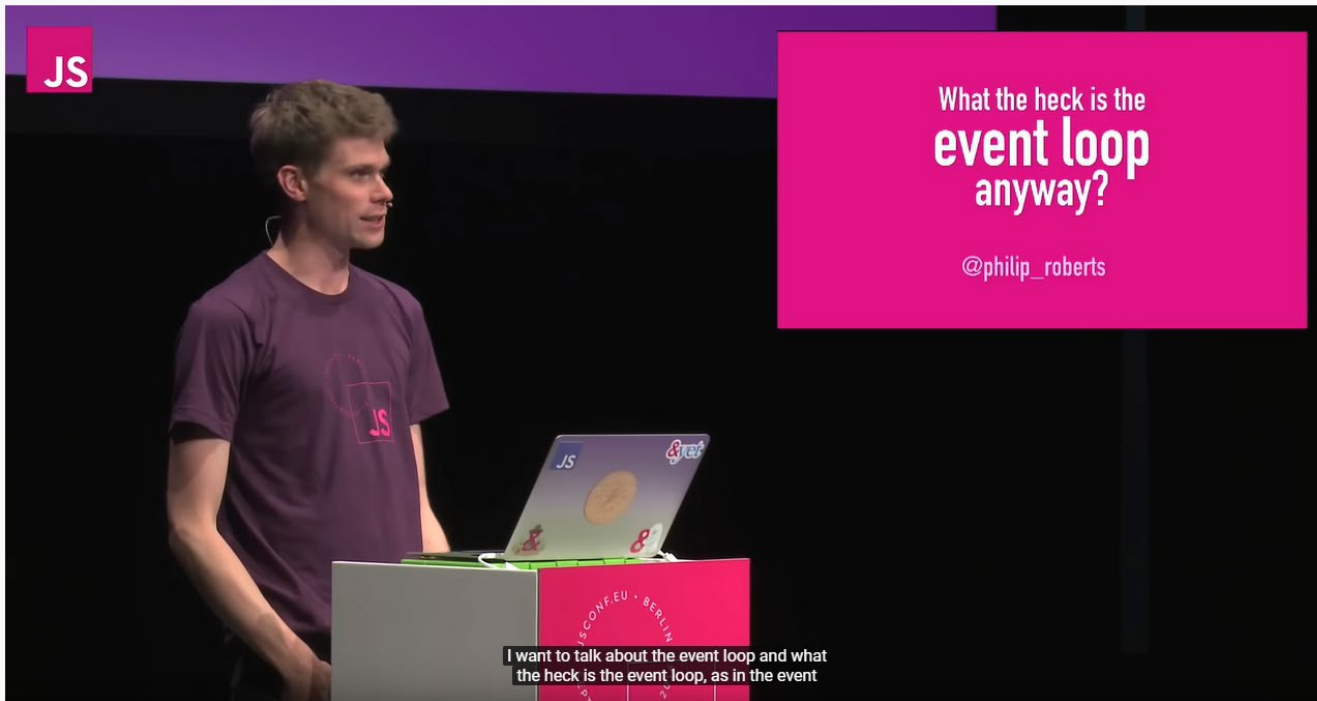
Below the code editor is a button labeled "Click me!" and an "Edit" button. To the right of the code editor are three panels:

- Call Stack**: A dashed box containing the text "Call Stack".
- Web Apis**: A dashed box containing the text "Web Apis".
- Callback Queue**: A dashed box containing the text "Callback Queue" and a blue circle icon with a mouse cursor pointing to it.

Between the "Call Stack" and "Web Apis" panels and above the "Callback Queue" panel is an orange circular refresh icon with two arrows.

# Javascript – Callback and Promise

<https://www.youtube.com/watch?v=8aGhZQkoFbQ>

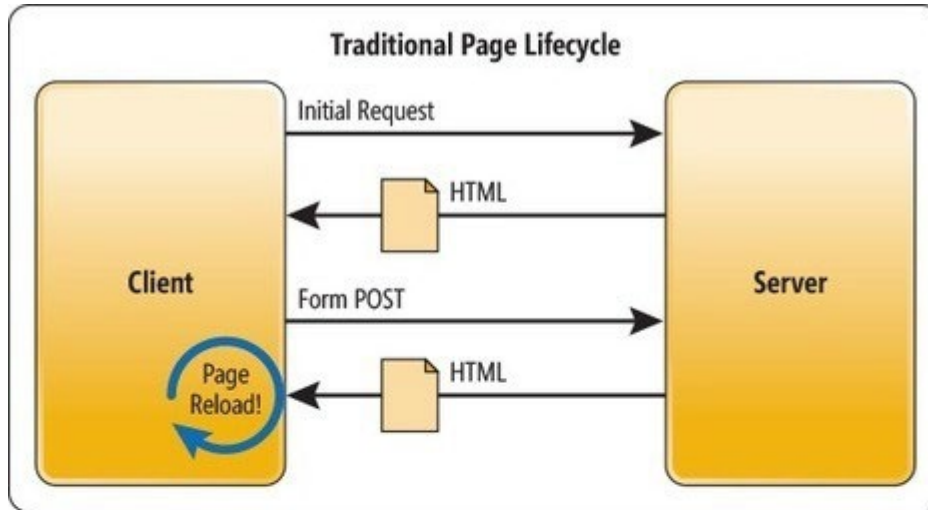


# Web e pattern architettonici

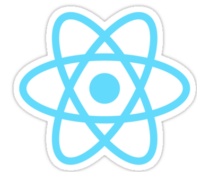
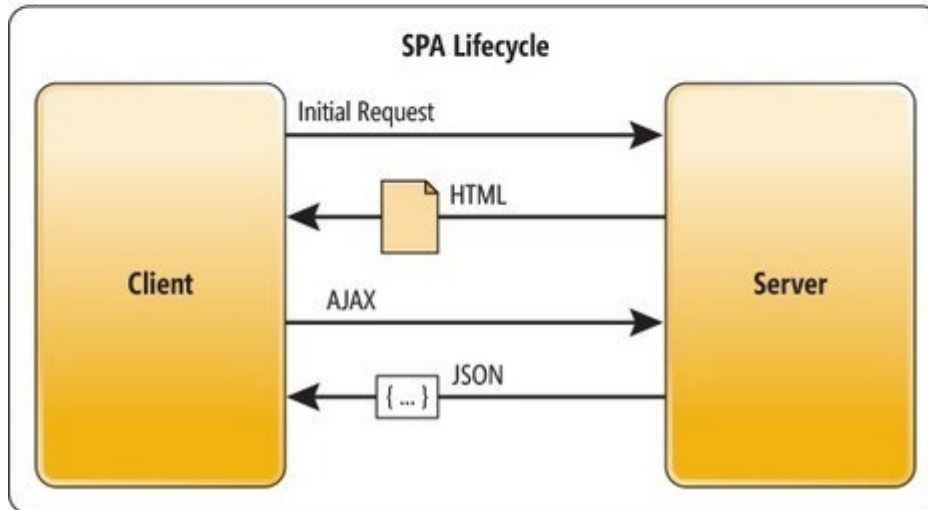


# Pattern architetturali

## Multi-Page Application



## Single-Page Application



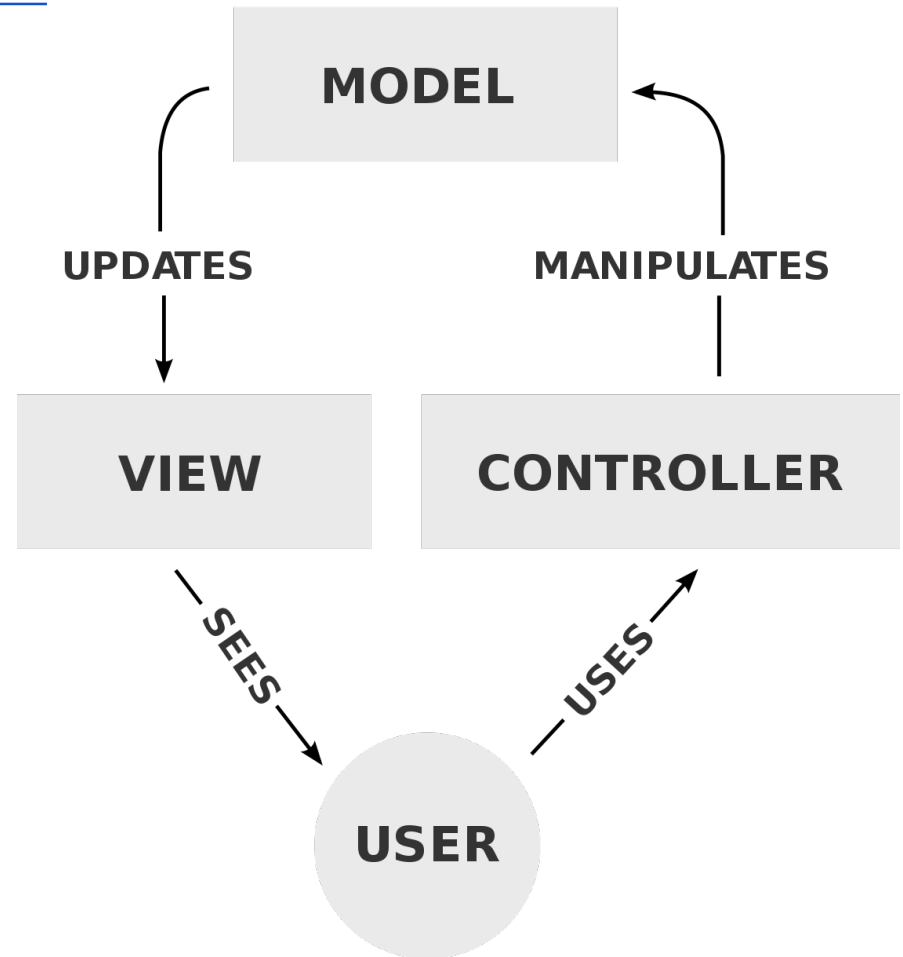
1/2/2019 11:25AM

# Pattern MVC

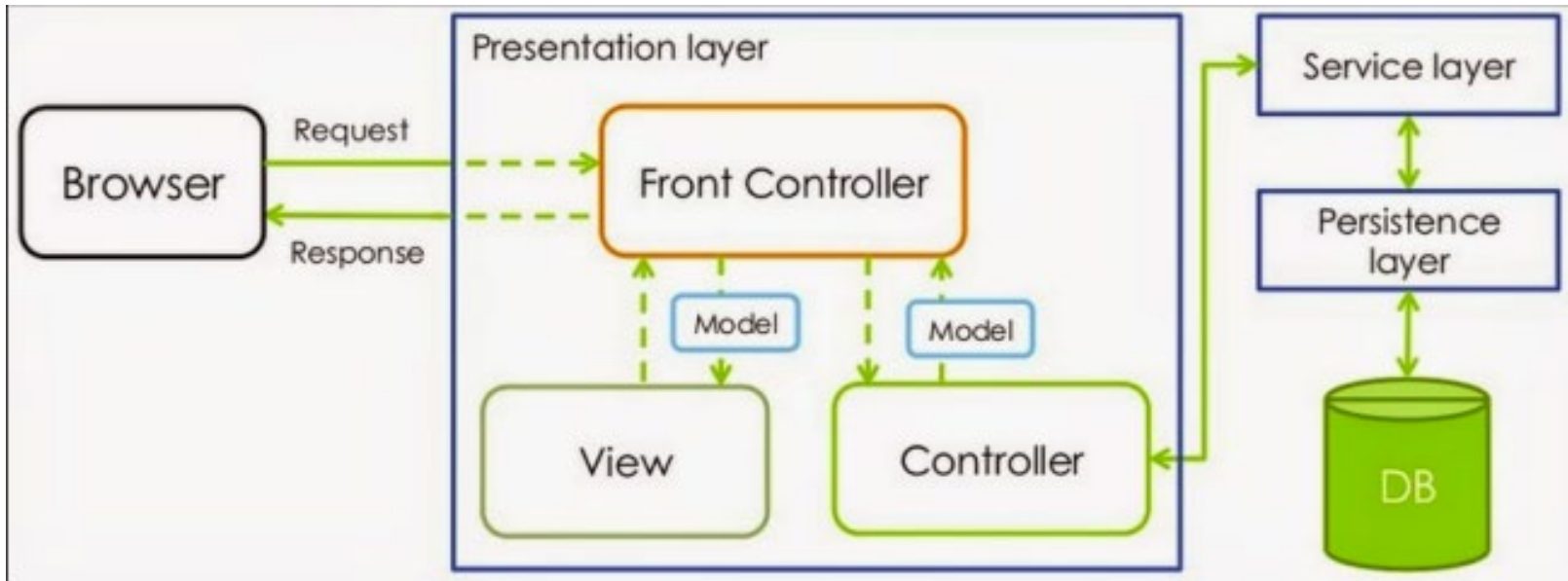
<https://it.wikipedia.org/wiki/Model-view-controller>

Vantaggi:

- 1) Disaccoppiare
- 2) Responsabilità certe
- 3) View multiple



# Architettura generica



The presentation layer is where the data is formatted and presented to the user.

The service layer is where the business logic of the application is implemented.

The persistence layer is where the data is simply saved or retrieved.

# AJAX – L'inizio delle SPA

<https://embed.plnkr.co/rgh75JGDGuyB4UhBvTYN/>

```
<body>
  <h1>Hello <span id="firstname"></span> <span id="lastname"></span>!</h1>
  <button onclick="reload_user();">Reload!</button>
  <p id="loadingtext">LOADING....</p>
</body>

</html>
```

```
$(document).ready(function() {
  reload_user();
});

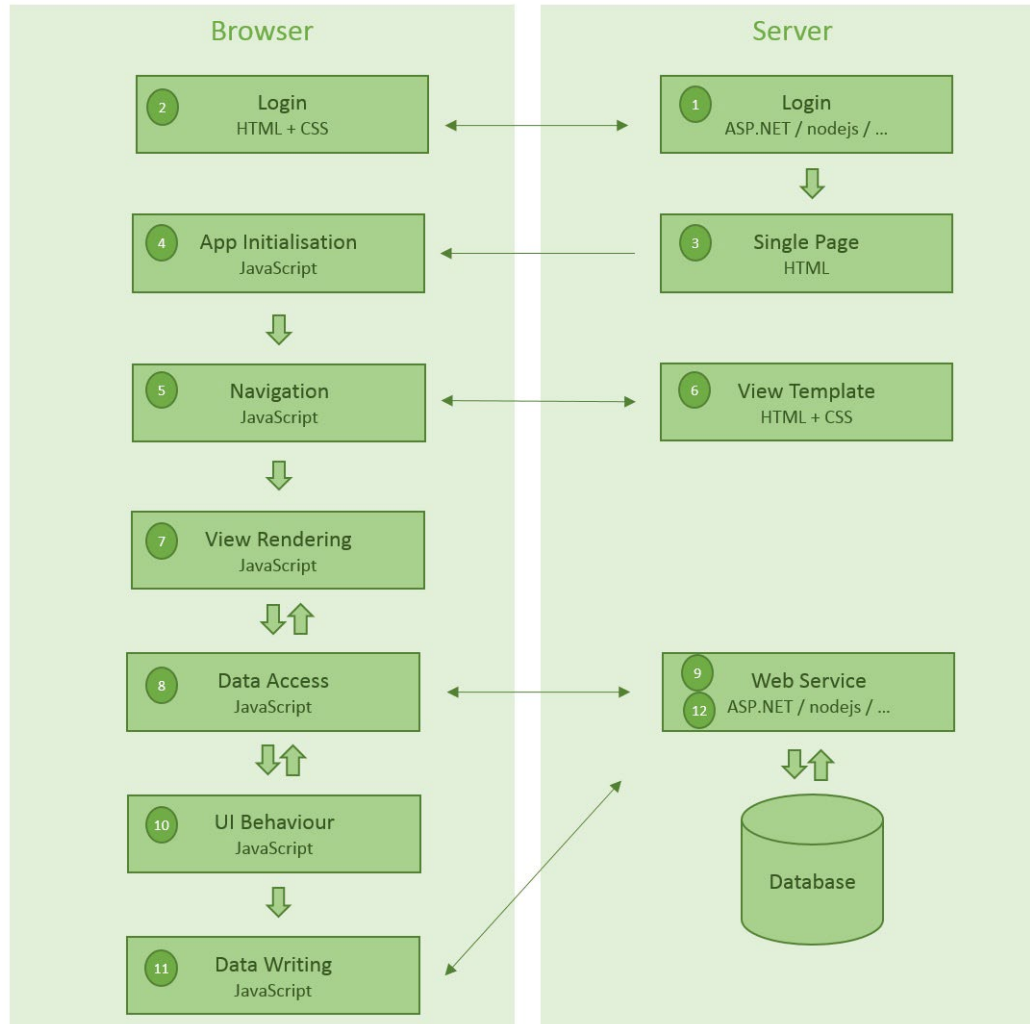
function reload_user(){
  $("#loadingtext").show();
  $.ajax({
    method: "get",
    url: "https://randomuser.me/api",
    datatype: "json",
    data: { results: 1 },
    success: function(r) {
      $("#firstname").text(r.results[0].name.first);
      $("#lastname").text(r.results[0].name.last);
    },
    error: function() {
      alert("error");
    },
    complete: function(){
      $("#loadingtext").fadeOut();
    }
  });
}
```



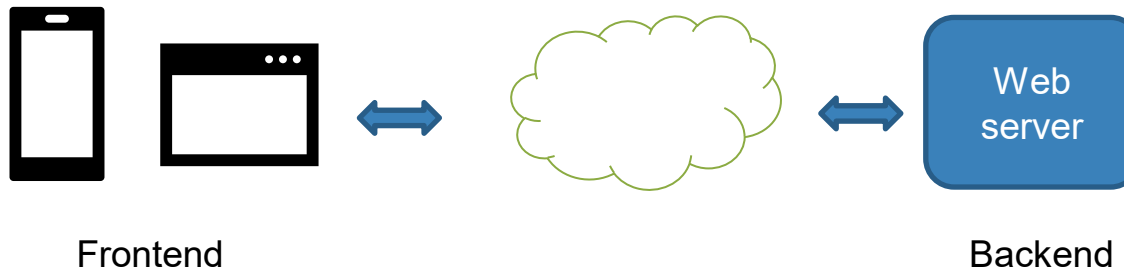
Asynchronous Javascript And XML



# Esempio di SPA



## Il mondo reale è composto da soluzioni ibride



Approcci ibridi  
Mix di soluzioni  
Evoluzione continua

Trend:

- PWA vs Mobile
- Low Code
- Serverless
- Static site generators
- MicroService

UI Bakery

<https://www.youtube.com/watch?v=xbB3MrEi5bo>

Less servers for your Angular app

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

Mastering Chaos - A Netflix Guide to Microservices

<https://www.youtube.com/watch?v=CZ3wluvmeM>

# Backend



## Di cosa si occupa il backend (o i backend)

- Rispondere a richieste da parte dei client su protocollo http/https/http2
- Interpretare le URL richieste/header/cookie
- Autenticare un utente
- Autorizzare un utente dopo la sua autenticazione
- Servire contenuti statici
- Generare pagine dinamiche
- Rispondere a chiamate REST da una SPA
- Gestire cache
- Servire contenuti in streaming
- .....

# Come fa il backend a rispondere alle richieste?

Semplicemente utilizzando i socket ed i metodi di listen

<https://docs.microsoft.com/it-it/dotnet/framework/network-programming/synchronous-server-socket-example>

```
// Create a TCP/IP socket.
Socket listener = new Socket(ipAddress.AddressFamily,
    SocketType.Stream, ProtocolType.Tcp );

// Bind the socket to the local endpoint and
// listen for incoming connections.
try {
    listener.Bind(localEndPoint);
    listener.Listen(10);

    // Start listening for connections.
    while (true) {
        Console.WriteLine("Waiting for a connection...");
        // Program is suspended while waiting for an incoming connection.
        Socket handler = listener.Accept();
        data = null;

        // An incoming connection needs to be processed.
        while (true) {
            int bytesRec = handler.Receive(bytes);
            data += Encoding.ASCII.GetString(bytes,0,bytesRec);
            if (data.IndexOf("<EOF>") > -1) {
                break;
            }
        }

        // Show the data on the console.
        Console.WriteLine( "Text received : {0}", data);

        // Echo the data back to the client.
        byte[] msg = Encoding.ASCII.GetBytes(data);

        handler.Send(msg);
        handler.Shutdown(SocketShutdown.Both);
        handler.Close();
    }
} catch (Exception e) {
    Console.WriteLine(e.ToString());
}
```

<https://gist.github.com/teadmiston/5935757>

```
9  var net = require('net');
10
11 var server = net.createServer(function(socket) {
12     socket.write('Echo server\r\n\r\n');
13     socket.pipe(socket);
14 });
15
16 server.listen(1337, '127.0.0.1');
17
```

Ma devo implementarmi il protocollo HTTP?

node  
express

NEXT.js

spring  
boot

ASP.NET Core

nest

# Come fa il backend a rispondere alle richieste con express?

<https://expressjs.com/en/starter/hello-world.html>



```
1 const express = require('express' 4.17.1 )
2 const app = express()
3 const port = 3000
4
5 app.get('/', (req, res) => res.send('Hello World!'))
6
7 app.listen(port, () => console.log(`Example app listening on port ${port}!`))
```

Save on RunKit

Node 10 ↕

help

URL: <https://jt9ee7g2hkau.runkit.sh>

Come restituire un file html

```
//assuming app is express Object.
app.get('/', function(req, res) {
  res.sendFile('index.html');
});
```

# Routing: Interpretare le URL richieste

Il routing è responsabile del mapping degli URI di richiesta agli endpoint e dell'invio di richieste in ingresso a tali endpoint. Le route sono definite e configurate all'avvio.

## Metodi di route

Un metodo di route deriva da uno dei metodi HTTP ed è collegato ad un'istanza delle classe `express`.

Il codice seguente è un esempio di route definite per i metodi GET e POST nella root dell'app.

```
// GET method route
app.get('/', function (req, res) {
  res.send('GET request to the homepage');
});

// POST method route
app.post('/', function (req, res) {
  res.send('POST request to the homepage');
});
```

Routing con parametri:

```
8
9  app.get('/contact', function(req, res){
10   res.send('this is the contact page');
11 });
12
13 app.get('/profile/:id', function(req, res){
14   res.send('You request get(key: ?) profile with the id of ' + req.params.id);
15 });
16
17 app.listen(3000);
```

# Rest

Tutti lo nominano ma  
pochi lo conoscono





## Rest

- ◎ **REPRESENTATIONAL STATE TRANSFER**
  - ◎ **È UN PARADIGMA**
  - ◎ **NON È UN PROTOCOLLO!**
- 
- ◎ **NASCE GRAZIE ALLA TESI DI Roy Fielding del 2000**
  - ◎ [https://www.ics.uci.edu/~fielding/pubs/dissertation/fielding\\_dissertation.pdf](https://www.ics.uci.edu/~fielding/pubs/dissertation/fielding_dissertation.pdf) (**PAGINA 75**)

## Principi del Rest

- ◎ REST is a **client-server** architecture
- ◎ REST is **stateless**
- ◎ REST is **cacheable**
- ◎ REST provides a **uniform interface** between components
- ◎ REST is a **layered system**
- ◎ REST optionally provides **code on demand**

## Principi del Rest

- © Richardson Maturity Model di **Martin Fowler**
- © <https://martinfowler.com/articles/richardsonMaturityModel.html>
- © <https://blog.restcase.com/4-maturity-levels-of-rest-api-design/>

### Glory of REST



Level 3: Hypermedia Controls

Level 2: HTTP Verbs

Level 1: Resources

Level 0: The Swamp of POX



## Esempio di rest

Risorsa	GET	POST	PUT	DELETE
	read	create	update	
<i>/books</i>	Ritorna una lista di libri	Crea un nuovo libro	Aggiorna i dati di tutti i libri	Elimina tutti i libri
<i>/books/145</i>	Ritorna uno specifico libro	metodo non consentito (405)	Aggiorna uno specifico libro	Elimina uno specifico libro

`GET /books/411/authors/ Restituisce la lista degli autori del libro 411`

`GET /books/411/authors/1 Restituisce l'autore #1 del libro 411`

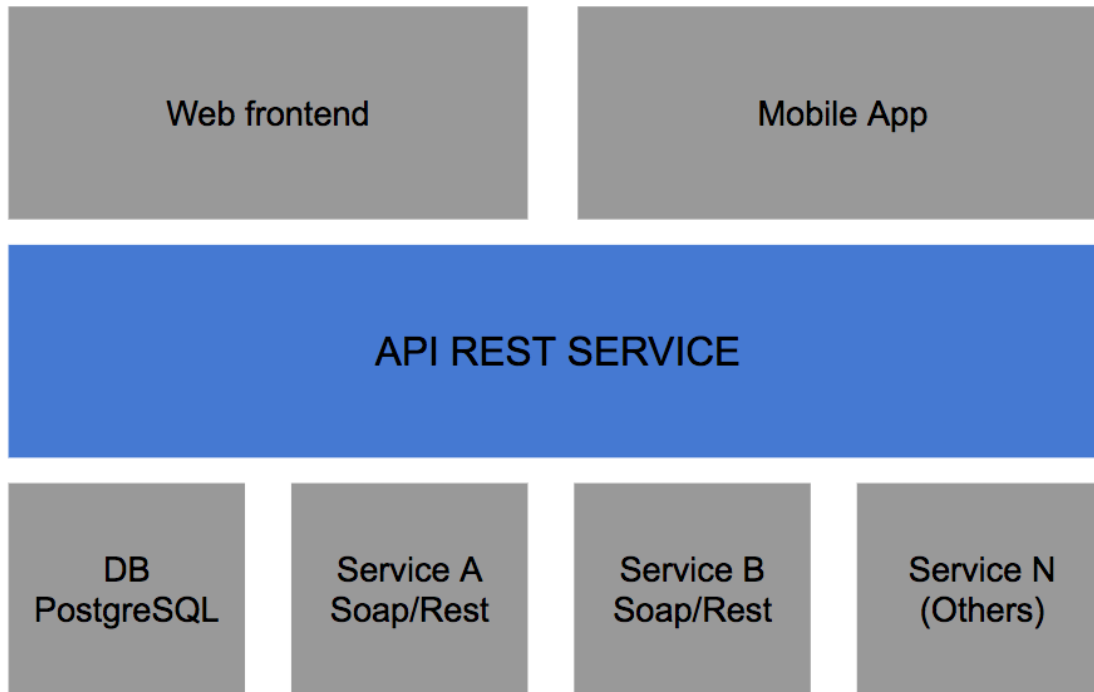
<https://developers.spreker.com/api/>

<https://developer.twitter.com/en/docs/api-reference-index>

<https://api.nasa.gov/>

## Perché tutti vogliono REST?

- ◎ **Facile**
- ◎ **Comprensibile**
- ◎ **Flessibile**



# NodeJs – ExpressJS – API Rest

```
var express = require('express');  
var app = express();
```

HTTP method for which the middleware function applies.

Path (route) for which the middleware function applies.

The middleware function.

```
app.get('/', function(req, res, next) {  
  next();  
})
```

Callback argument to the middleware function, called "next" by convention.

```
app.listen(3000);
```

HTTP response argument to the middleware function, called "res" by convention.

HTTP request argument to the middleware function, called "req" by convention.

<https://dev.to/lenmorld/quick-rest-api-with-node-and-express-in-5-minutes-336j>

<https://github.com/gothinkster/node-express-realworld-example-app>

# Security

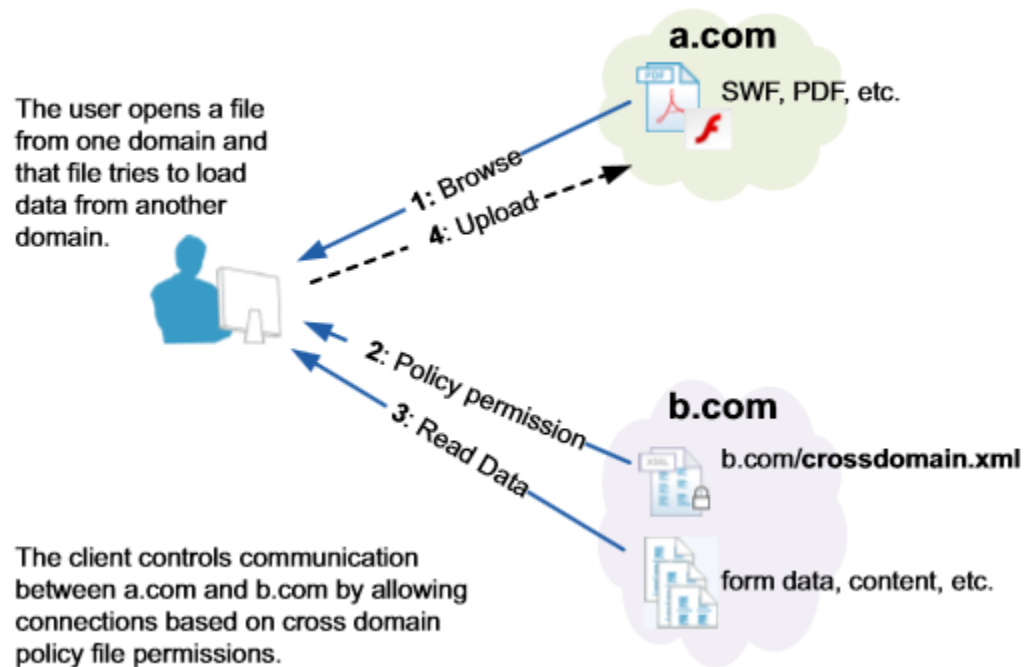
CORS



Cos'è:

**CORS:** Cross-Origin Resource Sharing

**Figure 1** Cross domain workflow





## Cos'è:

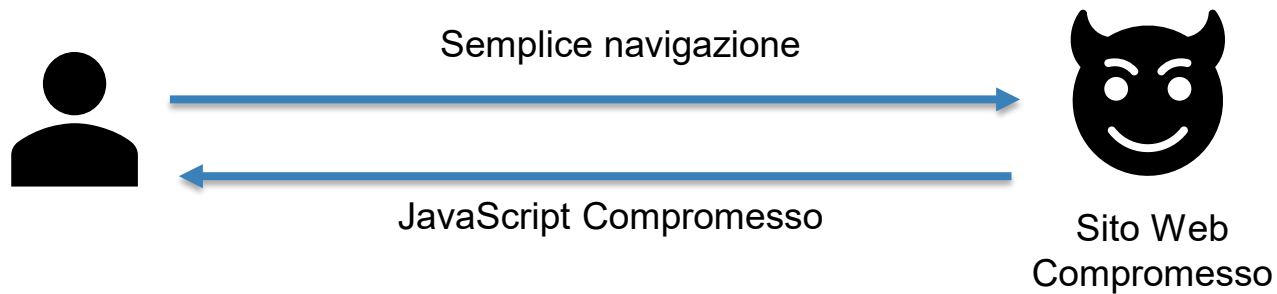
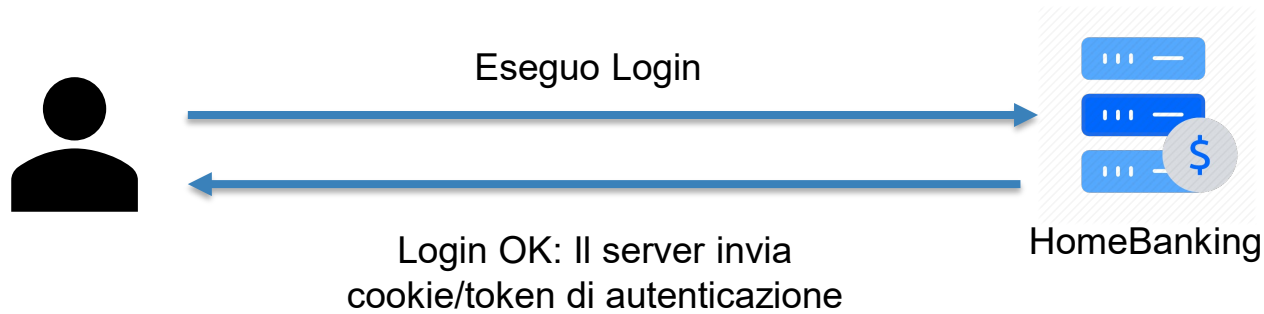
### **CORS:** Cross-Origin Resource Sharing

Il Cross-Origin Resource Sharing (CORS) è un meccanismo che usa header HTTP addizionali per indicare a un browser che un'applicazione Web in esecuzione su un'origine (dominio) dispone dell'autorizzazione per accedere alle risorse selezionate da un server di origine diversa. Un'applicazione web invia una **cross-origin HTTP request** quando richiede una risorsa che ha un'origine (protocollo, dominio e porta) differente dalla propria.

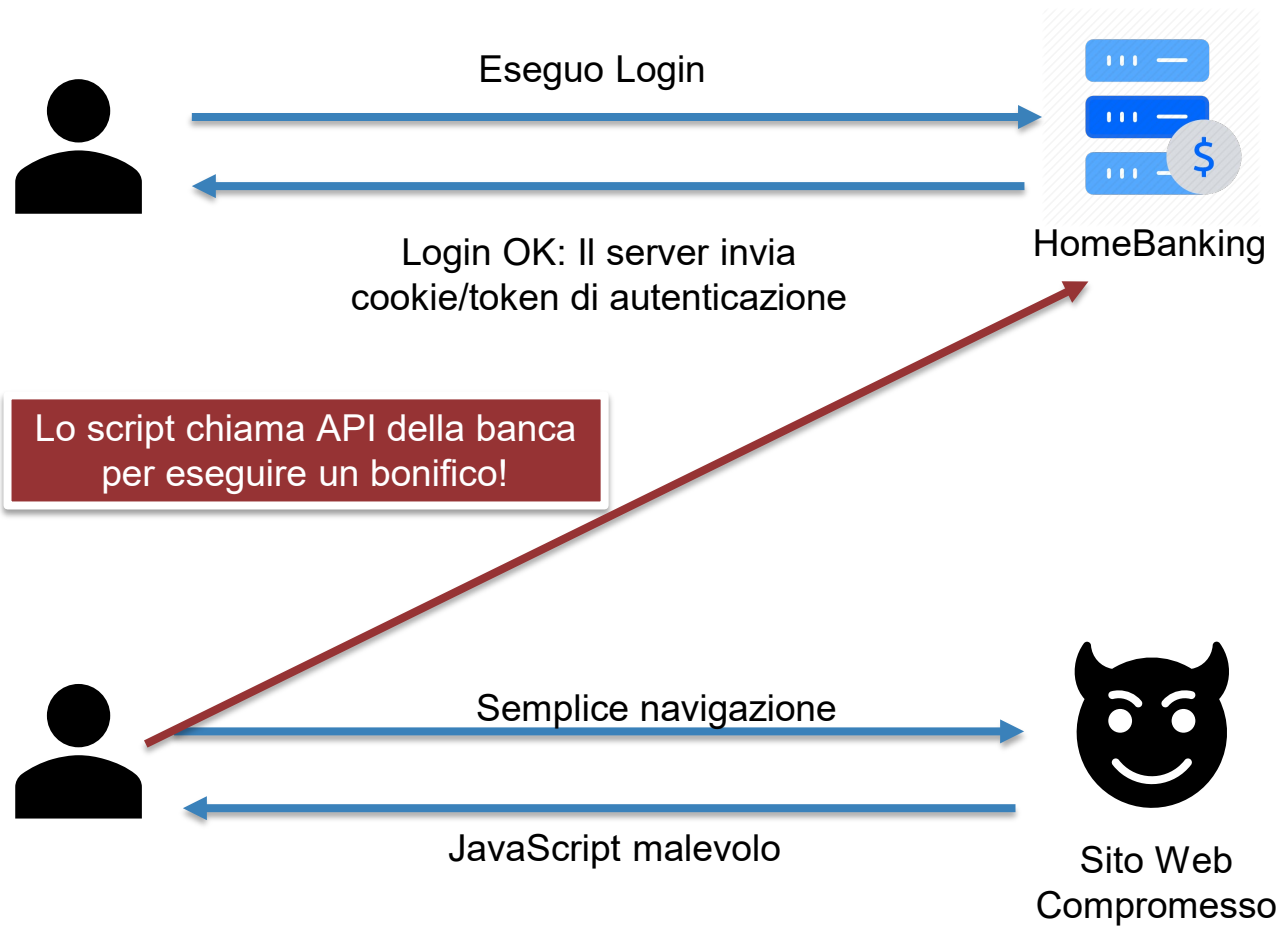
Esempio di cross-origin request: Il codice Javascript di frontend per un'applicazione web servita da `http://domain-a.com` utilizza `XMLHttpRequest` per inviare una richiesta a `http://api.domain-b.com/data.json`.

Importante: per permettere l'accesso su server di origine diversa si deve necessariamente **abilitare** e non disabilitare il CORS.

# Perché è importante il CORS e cosa combatte? Gli attacchi CSRF (Cross site request forgery)



# Perché è importante il CORS e cosa combatte? Gli attacchi CSRF (Cross site request forgery)



# Security

XSS



Cos'è:

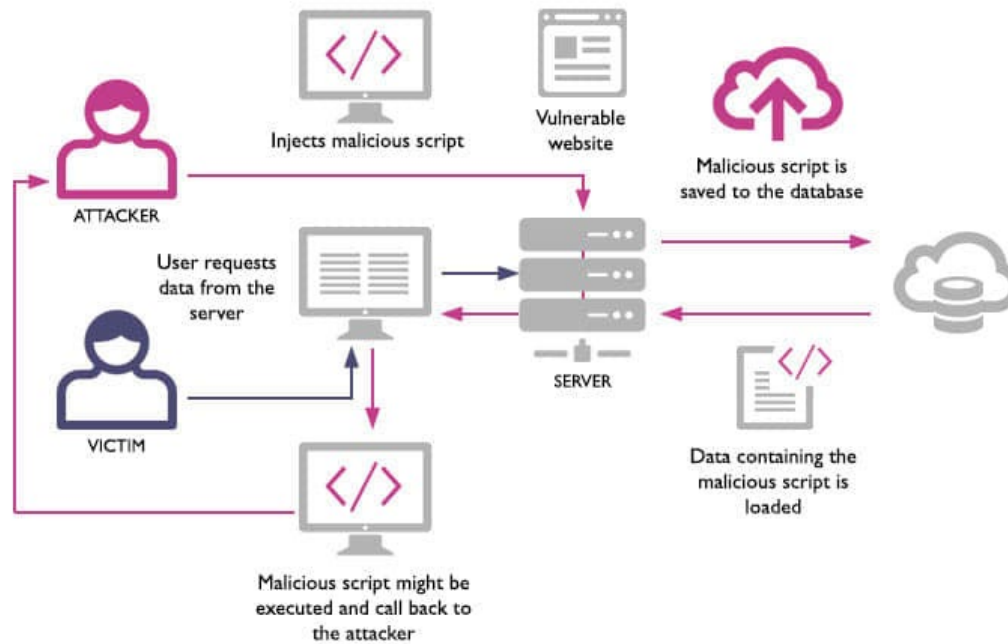
**XSS:** Cross-site scripting

Il **cross-site scripting (XSS)** è una [vulnerabilità](#) che affligge [siti web dinamici](#) che impiegano un insufficiente controllo dell'input nei [form](#).

[https://it.wikipedia.org/wiki/Cross-site\\_scripting](https://it.wikipedia.org/wiki/Cross-site_scripting)

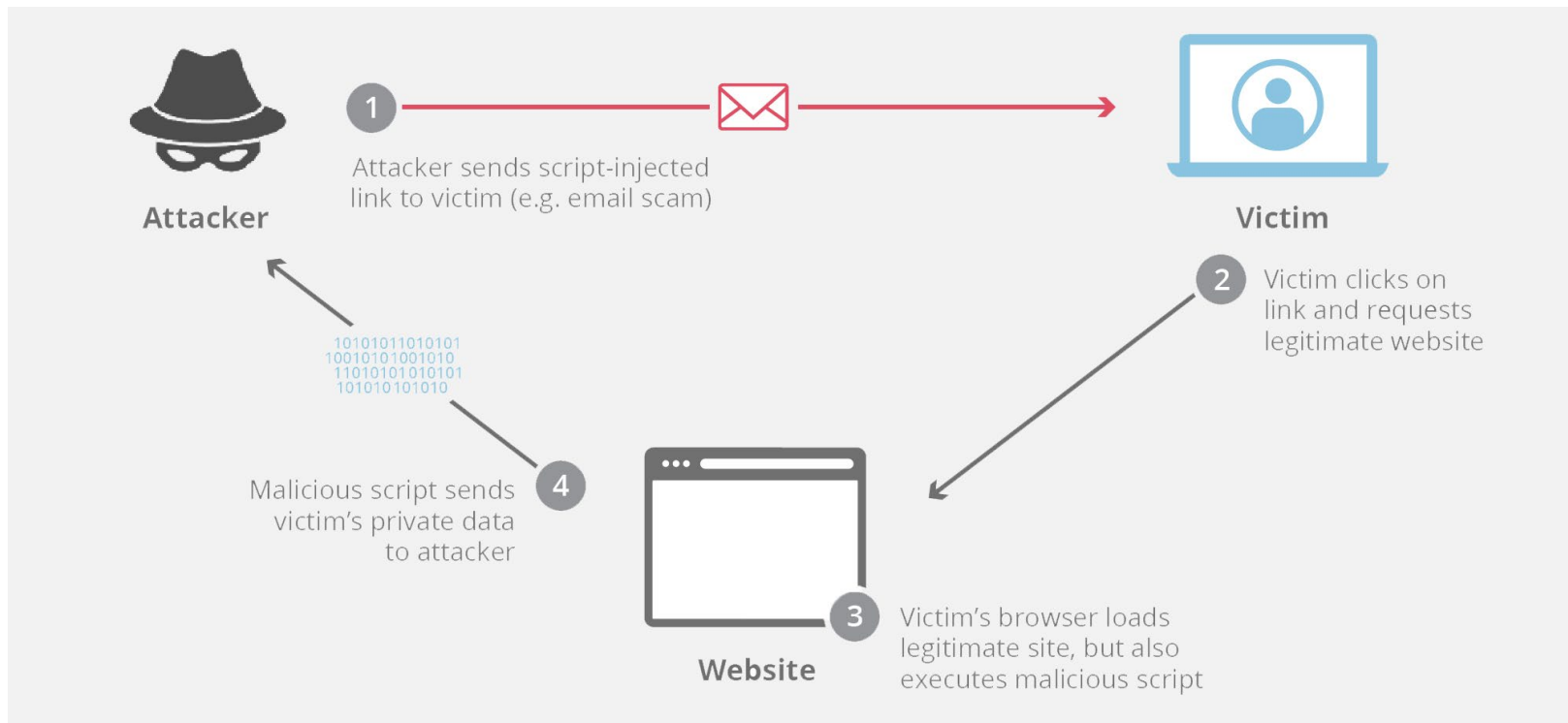
## Demo:

XSS storicizzato su DB



## Demo:

### XSS solo su client (phishing)



# Tipologie

Ogni app è un mix di tecnologie differenti





## Tipologie

Nativa

Si basa su ambienti di sviluppo e SDK proprietari della piattaforma ed il codice non risulta portabile.

Ibrida

Si basa su ambienti di sviluppo e SDK scelti dallo sviluppatore ed il codice risulta facilmente portabile.

Web (PWA)

Si basa su ambienti di sviluppo e SDK web ed il codice è unico.

# Tipologie

## Nativa

### Pro:

- Performante
- Accesso all'hardware
- GUI specifica
- Presente negli store
- API subito disponibili

### Contro:

- Onerosa (per ogni piattaforma ho un SDK)
- Codice non portabile

## Ibrida

### Pro:

- Sviluppo veloce
- Abbastanza Performante
- GUI specifica in alcuni casi
- Codice quasi portabile
- Presente negli store

### Contro:

- Accesso all'hardware limitato
- API non sempre disponibile

## Web (PWA)

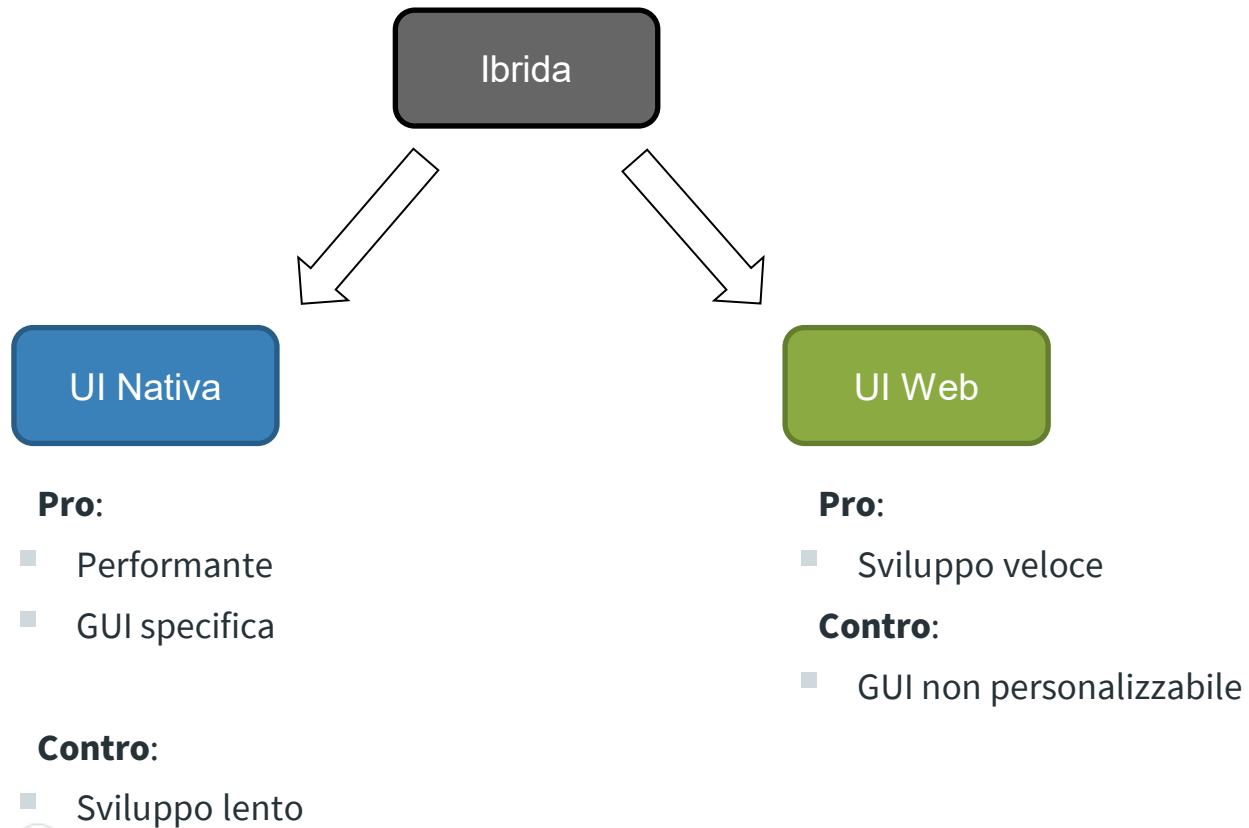
### Pro:

- Sviluppo velocissimo
- Un solo codice

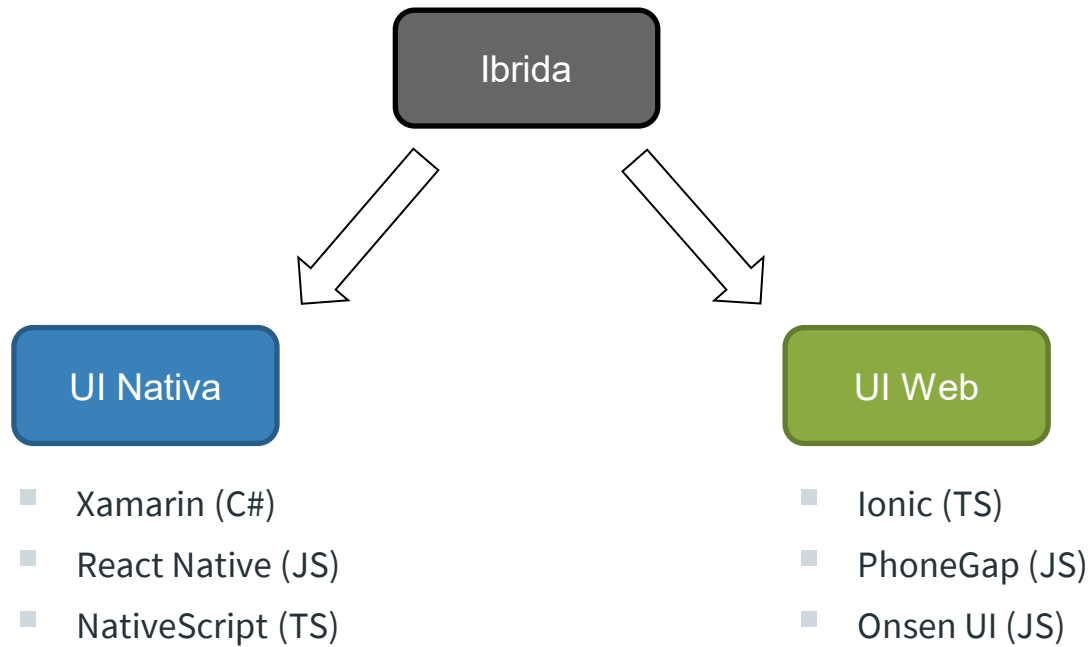
### Contro:

- Poco performante
- GUI generica
- Accesso all'hardware limitato
- Non presente negli store

## Tipologie ibride



## Framework per sviluppo ibrido



# Under the hood

AOT/JIT/Marshaling



# Compilatore

## AOT

ahead-of-time

La compilazione avviene una sola volta



## JIT

just-in-time

La compilazione avviene ad ogni avvio

- Android permette il JIT
- iOS non permette la compilazione JIT al di fuori della WKWebView

Nativa

Ibrida

Web (PWA)

AOT

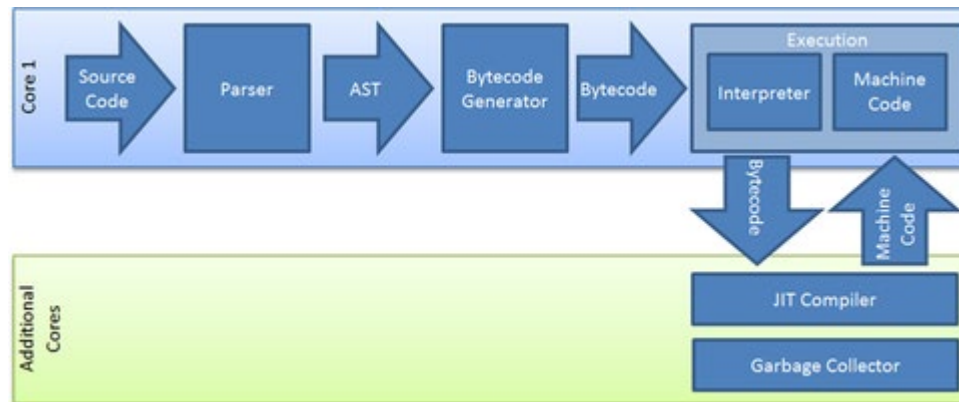
AOT/JIT

JIT

# Compilatore



## V8 Engine - Compilazione JIT di un JS





“

## *Ma come possiamo superare la mancanza di JIT in iOS?*

- ▲ No. JavaScriptCore on iOS 7+ won't be able to JIT compile for you, because iOS disallows mapping writable/executable pages of memory as a hard rule, and that's a requirement for JIT. Only MobileSafari.app, Web.app and a handful of other system apps carry an entitlement that allows them to JIT compile. The new WKWebView in iOS 8 is rendered in a separate process that is allowed to JIT compile, so JavaScript in a WKWebView is faster than a UIWebView or plain JSContext.



share edit flag

answered Jan 4 '15 at 20:52

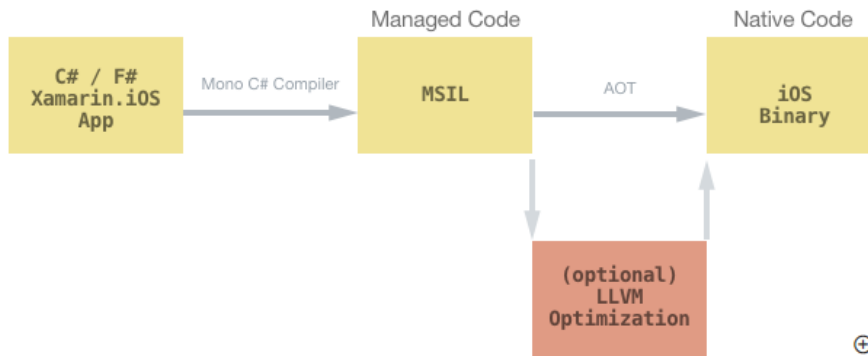


# Xamarin approach (C#)

## AOT

When you compile any Xamarin platform application, the Mono C# (or F#) compiler will run and will compile your C# and F# code into Microsoft Intermediate Language (MSIL). If you are running a Xamarin.Android, a Xamarin.Mac application, or even a Xamarin.iOS application on the simulator, the [.NET Common Language Runtime \(CLR\)](#) compiles the MSIL using a Just in Time (JIT) compiler. At runtime this is compiled into a native code, which can run on the correct architecture for your application.

However, there is a security restriction on iOS, set by Apple, which disallows the execution of dynamically generated code on a device. To ensure that we adhere to these safety protocols, Xamarin.iOS instead uses an Ahead of Time (AOT) compiler to compile the managed code. This produces a native iOS binary, optionally optimized with LLVM for devices, that can be deployed on Apple's ARM-based processor. A rough diagram of how this fits together is illustrated below:



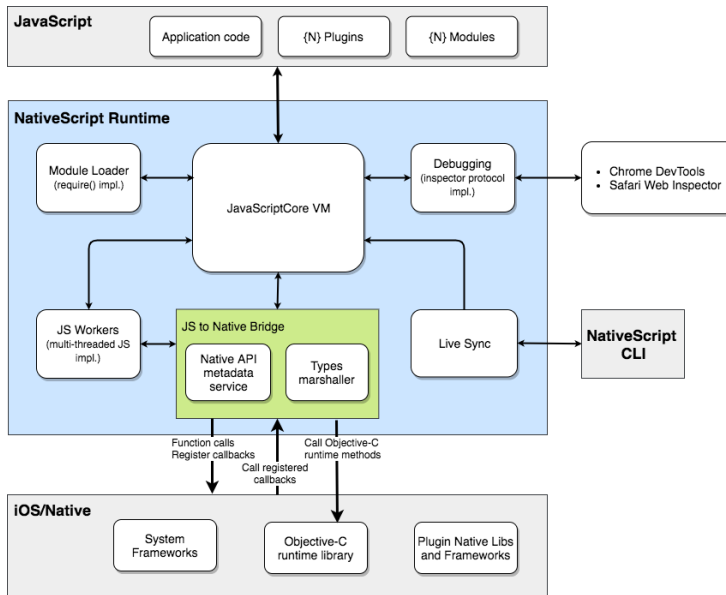
<https://docs.microsoft.com/en-us/xamarin/ios/internals/architecture>

<https://docs.microsoft.com/it-it/xamarin/ios/internals/limitations>

# Come superare il limite di iOS ed usare JS?

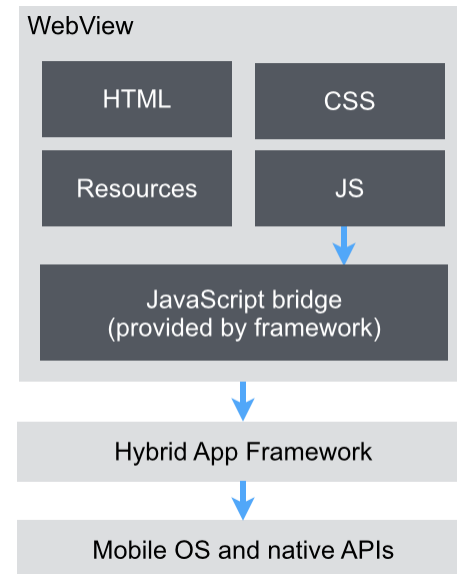
## Interprete

L'applicazione viene interpretata a runtime o pre compilata



## WebView

L'applicazione vive in un browser contenuto nell'app



- <https://docs.nativescript.org/core-concepts/android-runtime/overview>
- <https://docs.nativescript.org/core-concepts/ios-runtime/Overview>
- <https://www.nativescript.org/blog/the-new-ios-runtime-powered-by-v8>
- <https://v8.dev/blog/jitless>

## Come superare il limite di iOS ed usare JS?

### **Interprete**

L'applicazione viene interpretata o pre compilata

- Approccio complesso
- Performante
- UI Nativa
- Limiti nella compilazione
- Accesso hardware diretto
- Marshalling

### **WebView**

L'applicazione vive in un browser embedded

- Approccio semplice
- Lenta
- UI Web
- Nessun limite (JIT presente)
- Limiti nell'accesso hardware

# Marshalling

<https://docs.nativescript.org/runtimes/android/marshalling/overview>  
<https://docs.nativescript.org/runtimes/ios/marshalling/Marshalling-Overview>

## Cross-platform API

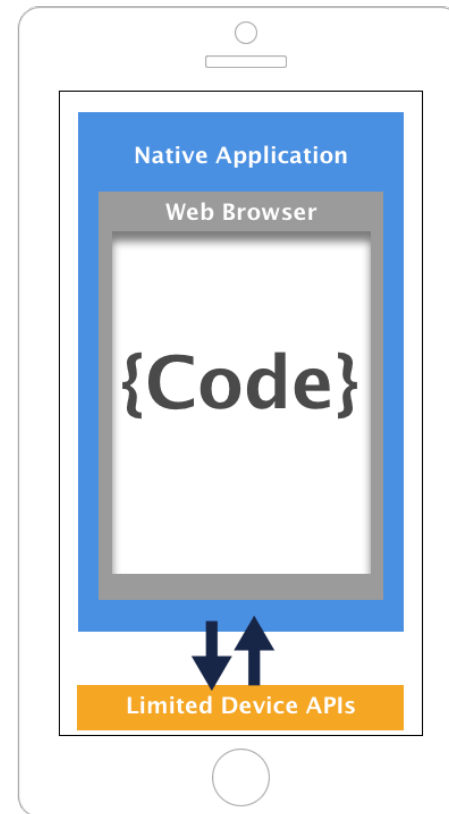
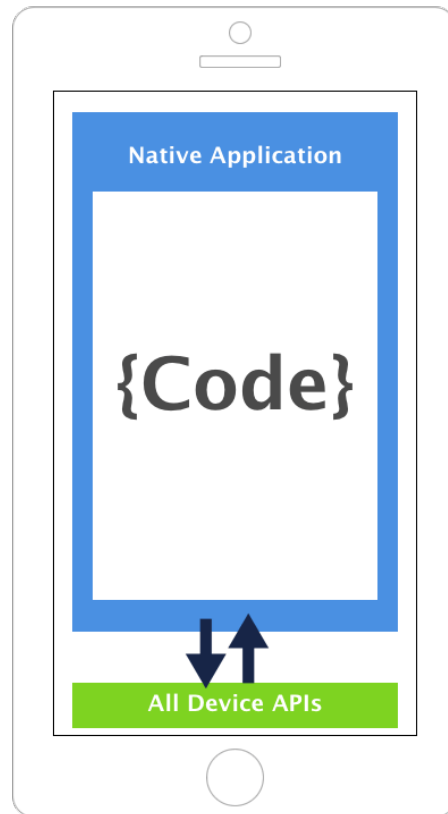
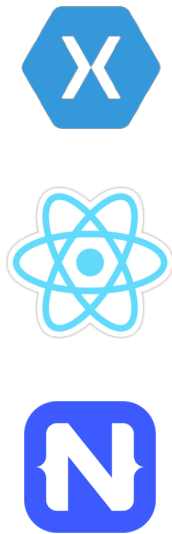


# Differenze sostanziali

<https://www.nativescript.org/blog/nativescript-and-xamarin>

Truly Native (Xamarin, NativeScript)

Hybrid Apps (Cordova, PhoneGap)

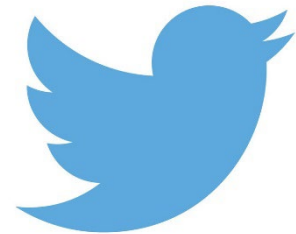




**17TH  
EDITION**  
DOWNLOAD  
RIGHT NOW

# Medium

Newsletter 





<https://github.com/denysdovhan/wtfjs>

# Security

resources





<https://www.shodan.io/>

<https://www.exploit-db.com/>

<https://worldofvnc.net/>

<https://haveibeenpwned.com/>

<https://www.troyhunt.com/data-enrichment-people-data-labs-and-another-622m-email-addresses/>



A network diagram background consisting of a central globe surrounded by a dashed circle, and a larger network of nodes and lines extending from the top right and bottom left corners. The globe is a purple outline showing the Americas. The nodes are small circles, some solid and some dashed, connected by thin lines.

**PWA**

Progressive Web App



“

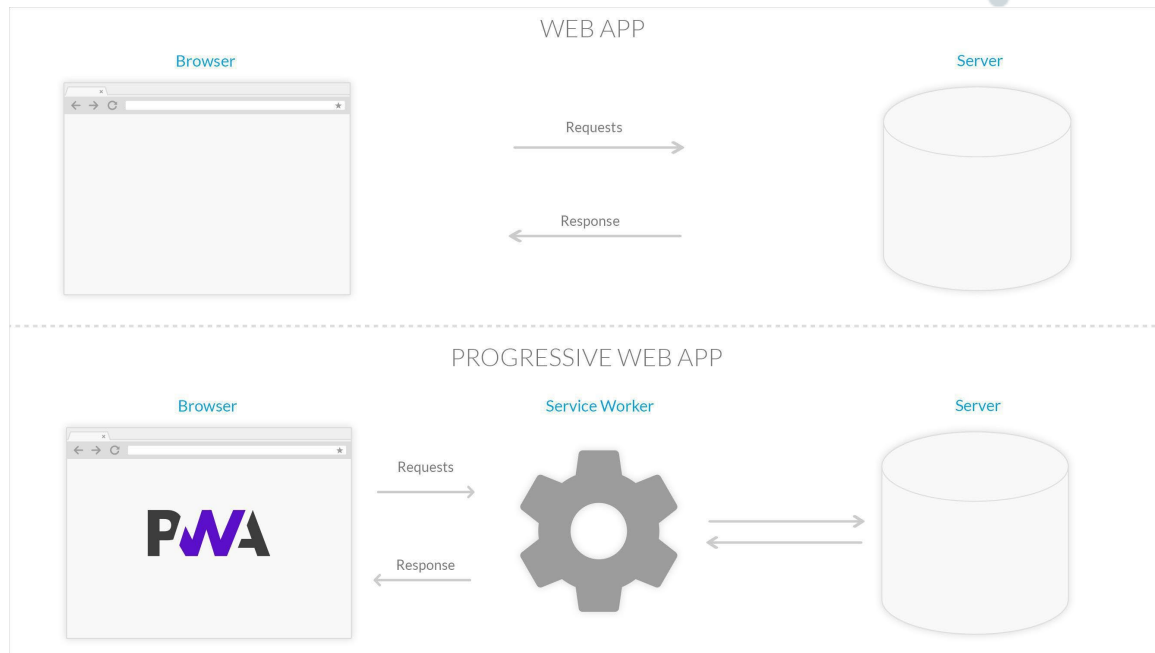
Il termine **Progressive Web App** (PWA, applicazioni web progressive) viene utilizzato per indicare una nuova metodologia per sviluppare software. Diversamente dalle applicazioni tradizionali, le progressive web apps sono un ibrido tra le normali pagine web (o siti web) e le applicazioni mobili. Questo nuovo modello di applicazioni cerca di combinare le possibilità offerte dalla maggior parte dei moderni browser con i benefici dell'utilizzo in mobilità.

[https://it.wikipedia.org/wiki/Progressive\\_web\\_app](https://it.wikipedia.org/wiki/Progressive_web_app)

## Few Requirements for PWA

- HTTPS
- Service Worker
- App Shell
- App manifest
- Connectivity-independent

# PWA: Service Worker



- Intercepting network requests
- Caching
- retrieving resources from the cache
- delivering push messages

<https://developers.google.com/web/tools/workbox>

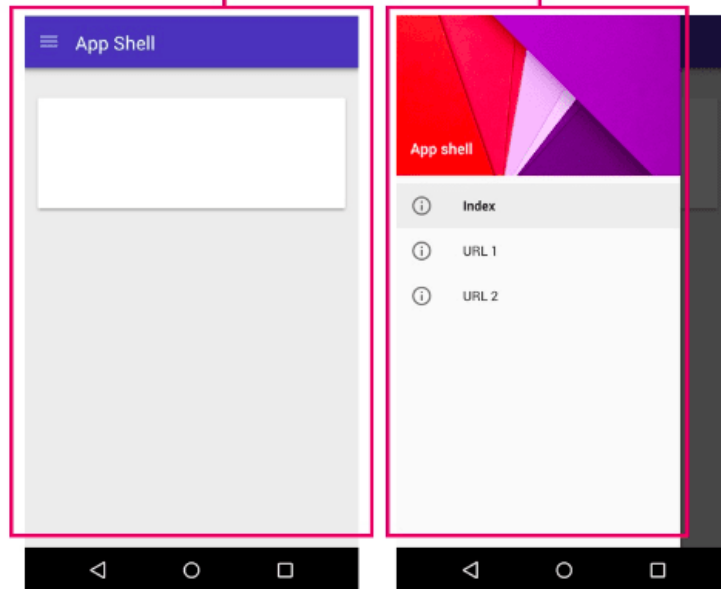
<https://ionicframework.com/pwa>

[https://developers.google.com/web/fundamentals/codelabs/offline#top\\_of\\_page](https://developers.google.com/web/fundamentals/codelabs/offline#top_of_page)

[https://blog.goodbarber.com/it/I-Service-Worker\\_a555.html](https://blog.goodbarber.com/it/I-Service-Worker_a555.html)

# PWA: App shell

application shell



Cached shell loads **instantly** on repeat visits.

content



Dynamic content then populates the view

<https://developers.google.com/web/fundamentals/architecture/app-shell?hl=it>

## PWA: Manifest

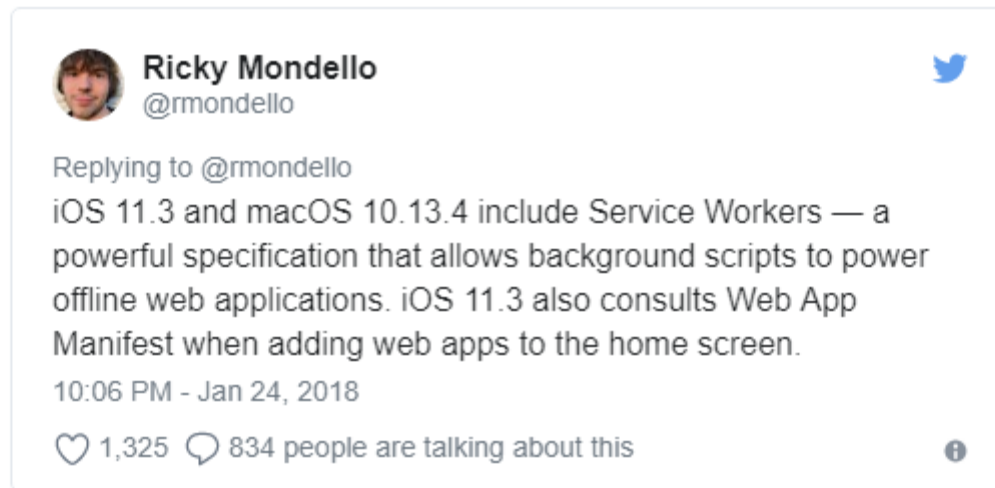
```
{
  "short_name": "AirHorner",
  "name": "Kinlan's AirHorner of Infamy",
  "icons": [
    {
      "src": "launcher-icon-1x.png",
      "type": "image/png",
      "sizes": "48x48"
    },
    {
      "src": "launcher-icon-2x.png",
      "type": "image/png",
      "sizes": "96x96"
    },
    {
      "src": "launcher-icon-4x.png",
      "type": "image/png",
      "sizes": "192x192"
    }
  ],
  "start_url": "index.html?launcher=true"
}
```



<https://developers.google.com/web/fundamentals/web-app-manifest/>  
<https://developer.mozilla.org/en-US/docs/Web/Manifest>

## PWA: Safari

Update : ios 11.3 supports web app manifest and service worker



Tweet about Service worker and manifest support

<https://medium.com/awebdeveloper/progressive-web-apps-pwas-are-coming-to-a-safari-near-you-216812aba5a>



# PWA: Sample

Table of Known Patterns for Building PWAs

Use-case	Patterns	Examples
Publishing	Full SSR	<a href="https://babe.news/">https://babe.news/</a> <a href="https://ampbyexample.com">https://ampbyexample.com</a> <a href="https://ampproject.org">https://ampproject.org</a>
Publishing	Application Shell	<a href="https://app.jalantikus.com/">https://app.jalantikus.com/</a> <a href="https://m.geo.tv/">https://m.geo.tv/</a> <a href="https://app.kompas.com/">https://app.kompas.com/</a> <a href="https://www.nfl.com/now/">https://www.nfl.com/now/</a> <a href="https://www.chromestatus.com">https://www.chromestatus.com</a>
Publishing	AppShell + SSR content for entry pages	<a href="https://react-hn.appspot.com">https://react-hn.appspot.com</a> <a href="https://www.polymer-project.org/1.0/">https://www.polymer-project.org/1.0/</a>
Publishing	Streams for body content / UI	<a href="https://wiki-offline.jakearchibald.com/wiki/The_Raccoons">https://wiki-offline.jakearchibald.com/wiki/The_Raccoons</a>
Social	AppShell	<a href="https://web.telegram.org/">https://web.telegram.org/</a>
E-commerce	Application Shell	<a href="https://m.aliexpress.com/">https://m.aliexpress.com/</a> <a href="https://kongax.konga.com/">https://kongax.konga.com/</a> <a href="https://m.flipkart.com (mobile/emulate)">https://m.flipkart.com (mobile/emulate)</a> <a href="https://m.airberlin.com/en/pwa">https://m.airberlin.com/en/pwa</a> <a href="https://shop.polymer-project.org/">https://shop.polymer-project.org/</a>
E-commerce	AppShell + SSR content for entry page	<a href="https://selio.com/ (try on mobile/emulate)">https://selio.com/ (try on mobile/emulate)</a> <a href="https://lite.5milesapp.com/ (partial)">https://lite.5milesapp.com/ (partial)</a>
Conference	AppShell	<a href="https://events.google.com/io2016/schedule">https://events.google.com/io2016/schedule</a>

## Top PWA examples

### Table of Contents

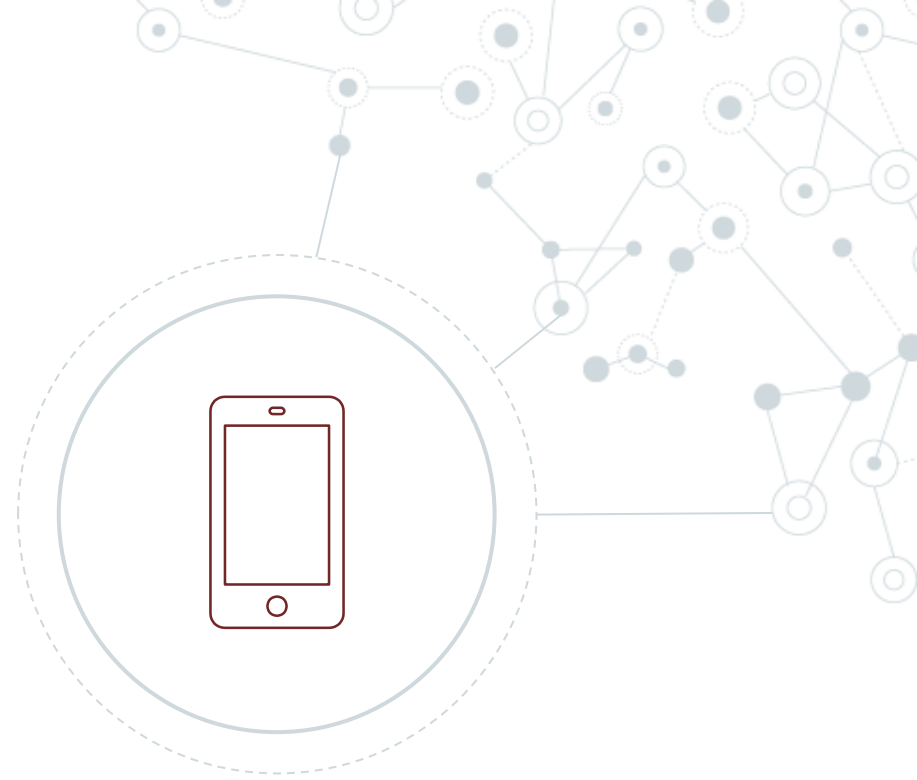
- I. Trivago Hotel Booking
- II. Pinterest
- III. Tinder
- IV. 9Gag
- V. OLX
- VI. Starbucks
- VII. Forbes

<https://pwa.rocks/>

<https://appmaker.xyz/pwa-examples-successful-progressive-web-apps/>

[https://developers.google.com/web/ilt/pwa/introduction-to-progressive-web-app-architectures#table\\_of\\_known\\_patterns\\_for\\_building\\_pwas](https://developers.google.com/web/ilt/pwa/introduction-to-progressive-web-app-architectures#table_of_known_patterns_for_building_pwas)

# Wireframe Prototipi e Mockup



# Differenze

## WireFrame

- Statico
- Solo contenuti e scheletro

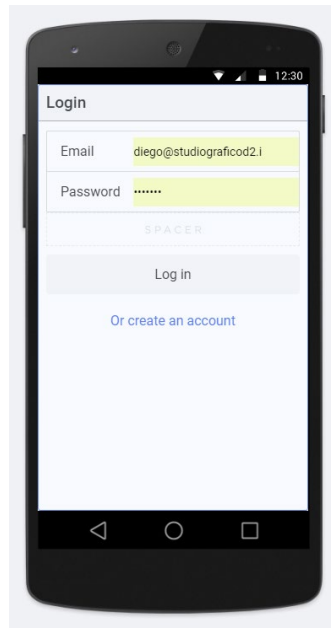
<https://balsamiq.com/>



## Prototipo

- Interattivo
- Grafica ad alto livello
- Vicino al prodotto finale

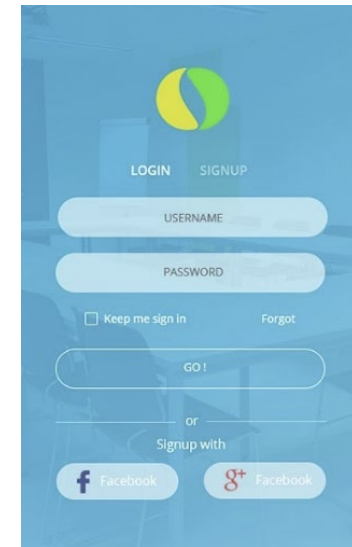
<https://creator.ionic.io>



## Mockup

- Statico
- Grafica alto livello

Adobe Photoshop





Ionic





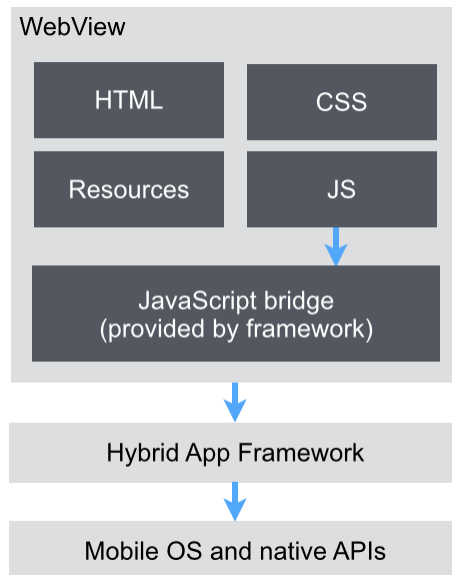
# Programma

- Di cosa si tratta?
- Le tecnologie utilizzate
- Setup ambiente
- La struttura del progetto base
- I componenti base
- Alcuni servizi utili
- ...

Di cosa si tratta?

## WebView

L'applicazione vive in un browser contenuto nell'app

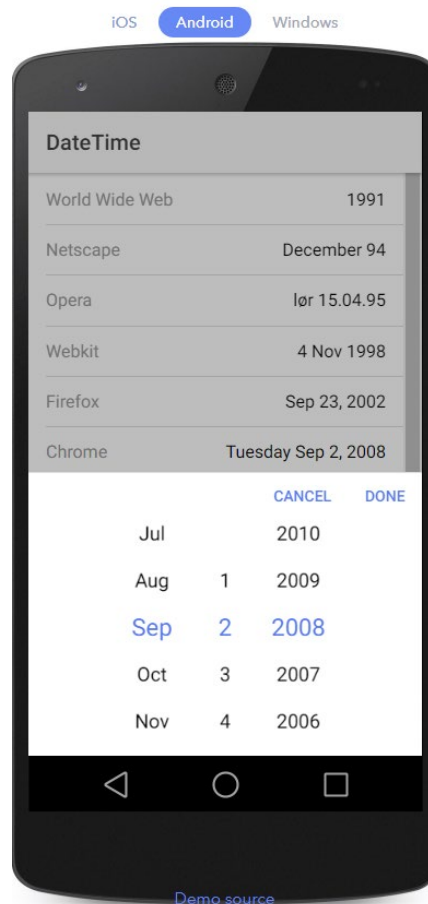
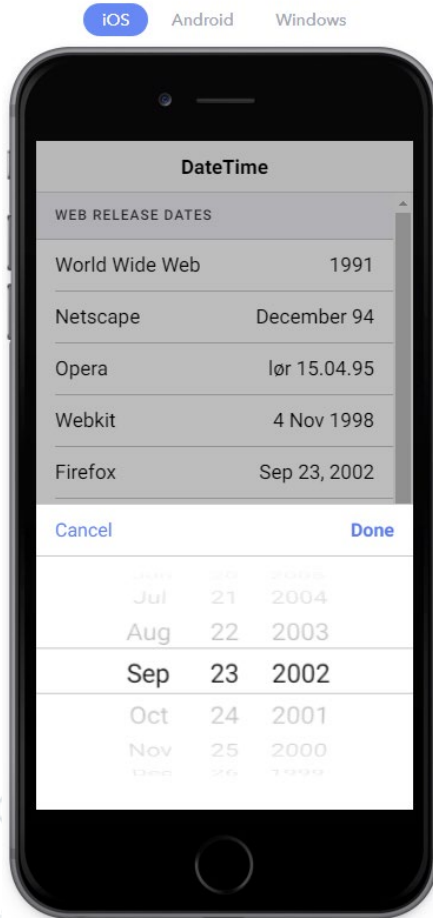


**Ionic permette di sviluppare applicazioni mobile ibride sfruttando tecnologie web che tentano di riprodurre il comportamento nativo del sistema**

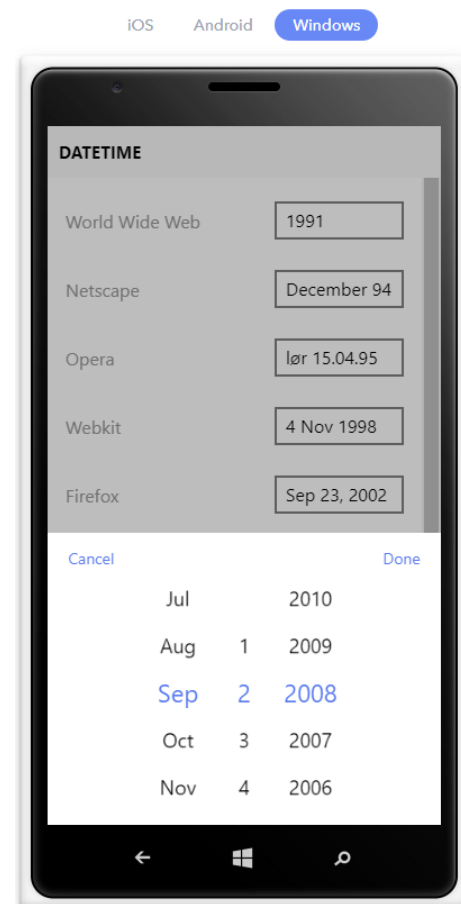
# Di cosa si tratta?

Un solo tag html:

```
<ion-datetime displayFormat="MM/DD/YYYY" [(ngModel)]="myDate"></ion-datetime>
```



[Demo source](#)



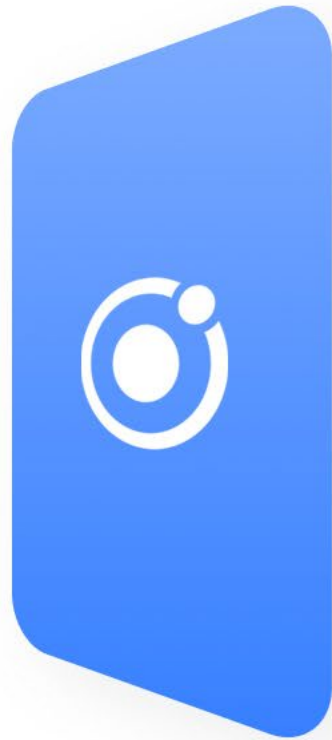
[Demo source](#)



# Le tecnologie utilizzate



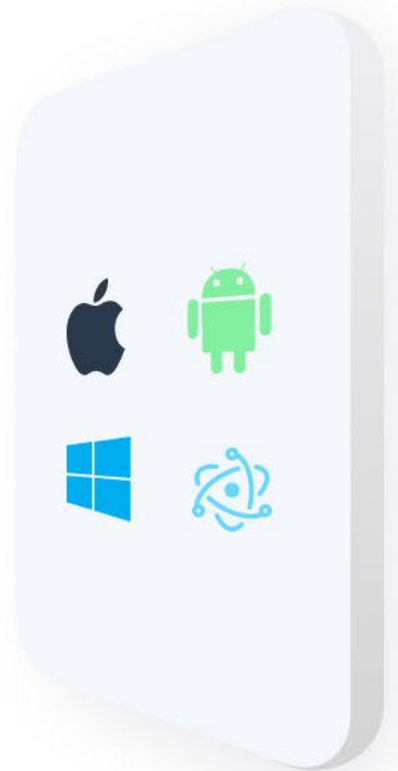
YOUR APP (ANGULAR, REACT, VUE...)



UI CONTROLS (IONIC)



NATIVE ACCESS (CAPACITOR)



DISTRIBUTION PLATFORMS

## Le tecnologie utilizzate



TypeScript: linguaggio di programmazione (superset di JavaScript)



HTML5: linguaggio di markup per pagine web



Sass/scss: estensione del css per definire fogli di stile

# Setup

- Installare nodejs LTS
- Installare un IDE come VSCODE
- Eseguire: `npm install -g @ionic/cli`
- Eseguire: `ionic start «nomeprogetto»`
- Scegliere «conference» come esempio di app
- Condividere la stessa rete tra notebook e smartphone oppure usare il remote debugging di Chrome
- Entrare nella cartella del progetto ed eseguire: «`ng serve`»

# Struttura

Immagini e risorse

app

main

pages

The screenshot shows the Visual Studio Code interface for a project named 'schedule.ts - myProget'. The Explorer sidebar on the left displays the project structure:

- EXPLORER
  - OPEN EDITORS
    - TS schedule.ts src\pages\schedule
  - MYPROGET
    - .github
    - .sourcemaps
    - .tmp
    - node\_modules
    - resources
    - src
      - app
        - app.component.ts
        - app.module.ts
        - app.scss
        - app.template.html
        - main.ts
      - assets
      - interfaces
      - pages
        - about
          - about.html
          - about.scss
          - about.ts
        - about-popover
          - about-popover.ts
        - account
        - login
          - login.html
          - login.scss
          - login.ts
        - man

The main editor shows the content of 'TS schedule.ts':

```
1 import { Component, ViewChild } from '@angular/core';
2
3 import { AlertController, App, FabContainer, ItemSliding, List, Mo
4
5 /*
6  To learn how to use third party libs in an
7  Ionic app check out our docs here: http://ionicframework.com/doc
8  */
9 // import moment from 'moment';
10
11 import { ConferenceData } from '../../providers/conference-data';
12 import { UserData } from '../../providers/user-data';
13
14 import { SessionDetailPage } from '../session-detail/session-detail
15 import { ScheduleFilterPage } from '../schedule-filter/schedule-fi
16
17
18 @Component({
19   selector: 'page-schedule',
20   templateUrl: 'schedule.html'
21 })
22 export class SchedulePage {
23   // the list is a child of the schedule page
24   // @ViewChild('scheduleList') gets a reference to the list
25   // with the variable #scheduleList, 'read: List' tells it to ret
26   // the List and not a reference to the element
27   @ViewChild('scheduleList', { read: List }) scheduleList: List;
28
29   dayIndex = 0;
30   queryText = '';
31   segment = 'all';
32   excludeTracks: any = [];
33   shownSessions: any = [];
34   groups: any = [];
```

# Pagina

# Azione

view

controller

The image shows a development environment with three main components:

- EXPLORER:** A file explorer on the left showing a project structure. The file `about.html` is selected under the `pages/about` directory.
- EDITOR:** The main workspace showing the HTML code for `about.html`. The code includes an `<ion-header>` with a menu toggle and a 'more' button, and an `<ion-content>` with a header, a date, a location, and a list of items.
- MOBILE PREVIEW:** A small window on the right showing the rendered mobile application. The page title is 'About' and it features the Ionic logo, the text 'Ionic Conference', and details like 'Date: May 17, 2047' and 'Location: Madison, WI'.

Red arrows point from the labels 'view' and 'controller' to the `about.html` file in the Explorer. Another red arrow points from the label 'Azione' to the `presentPopover($event)` function call in the HTML code.

ference

# Componenti per UI

ActionSheetController

AlertController

App

Avatar

Badge

Button

Checkbox

Chip

Col

Config

Content

DateTime

Events

FabButton

FabContainer

FabList

Footer

Grid

Haptic

Header

HideWhen

Icon

<https://ionicframework.com/docs/components/>

## Menus

Menu is a side-menu navigation that can be dragged out or toggled to show. The content of a menu will be hidden when the menu is closed.

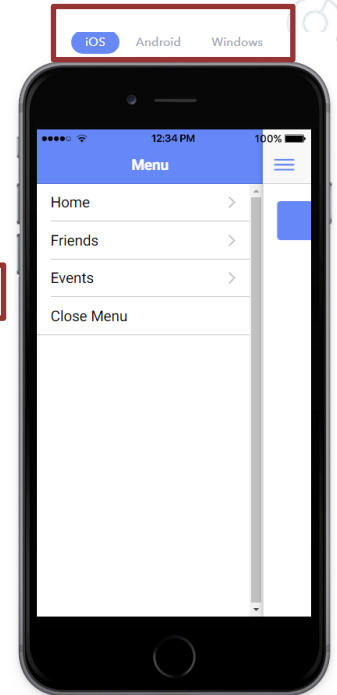
Menu adapts to the appropriate style based on the platform.

*For more information, Check out the [API docs](#).*

### Basic Usage

```
<ion-menu [content]="content">
  <ion-header>
    <ion-toolbar>
      <ion-title>Menu</ion-title>
    </ion-toolbar>
  </ion-header>
  <ion-content>
    <ion-list>
      <button ion-item (click)="openPage(homePage)">
        Home
      </button>
      <button ion-item (click)="openPage(friendsPage)">
        Friends
      </button>
      <button ion-item (click)="openPage(eventsPage)">
        Events
      </button>
      <button ion-item (click)="closeMenu()">
        Close Menu
      </button>
    </ion-list>
  </ion-content>
</ion-menu>
```

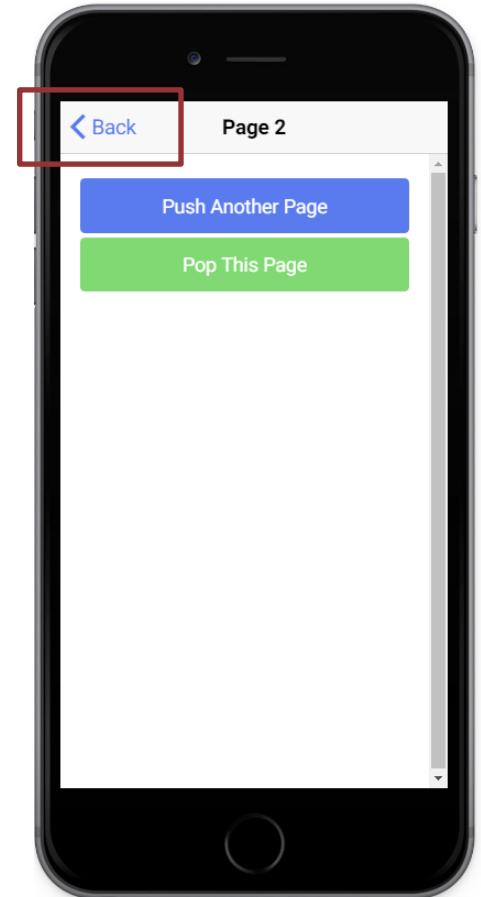
[Demo Source](#)



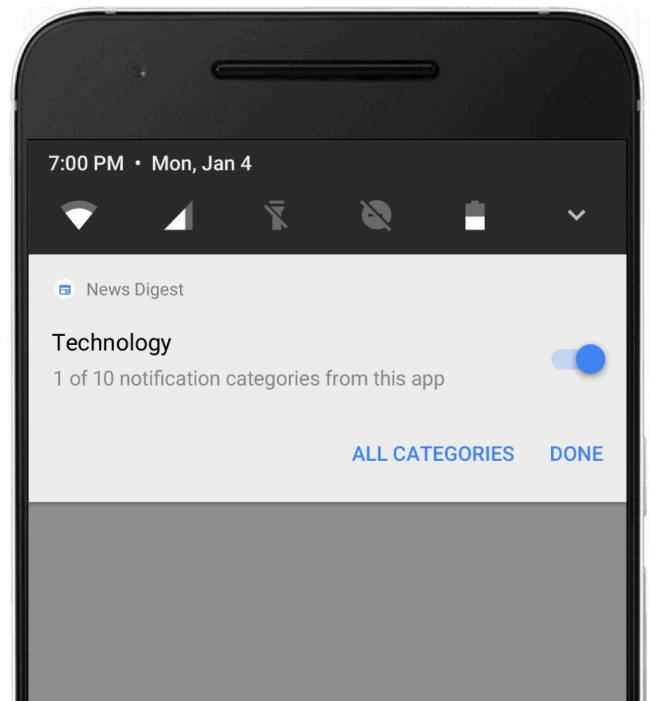
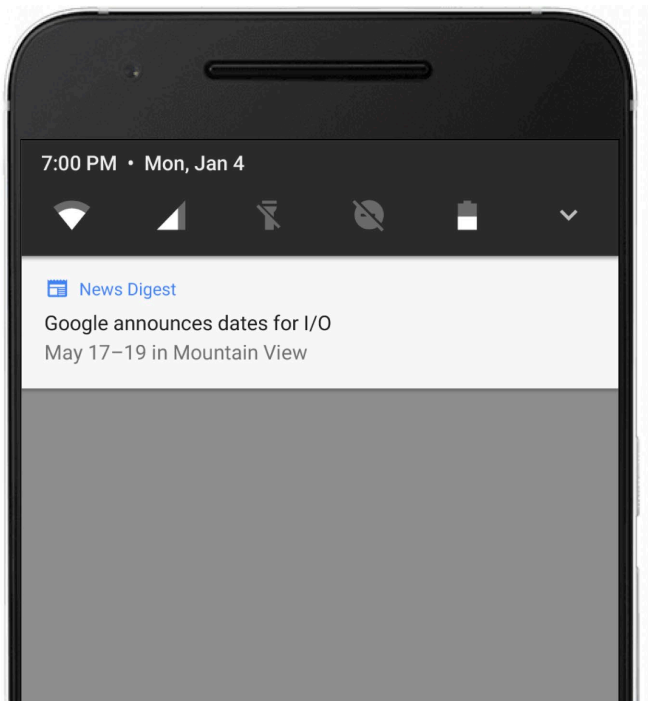
Attiva Windows  
Passa a Impostazioni per attivare Windows.

# Componente NavController

NavController is the base class for navigation controller components like `Nav` and `Tab`. You use navigation controllers to navigate to `pages` in your app. At a basic level, a navigation controller is an array of pages representing a particular history (of a `Tab` for example). This array can be manipulated to navigate throughout an app by pushing and popping pages or inserting and removing them at arbitrary locations in history.



# Push Notification



<https://ionicframework.com/docs/native/push>

<https://knowledge.opsview.com/docs/getting-started-with-push>



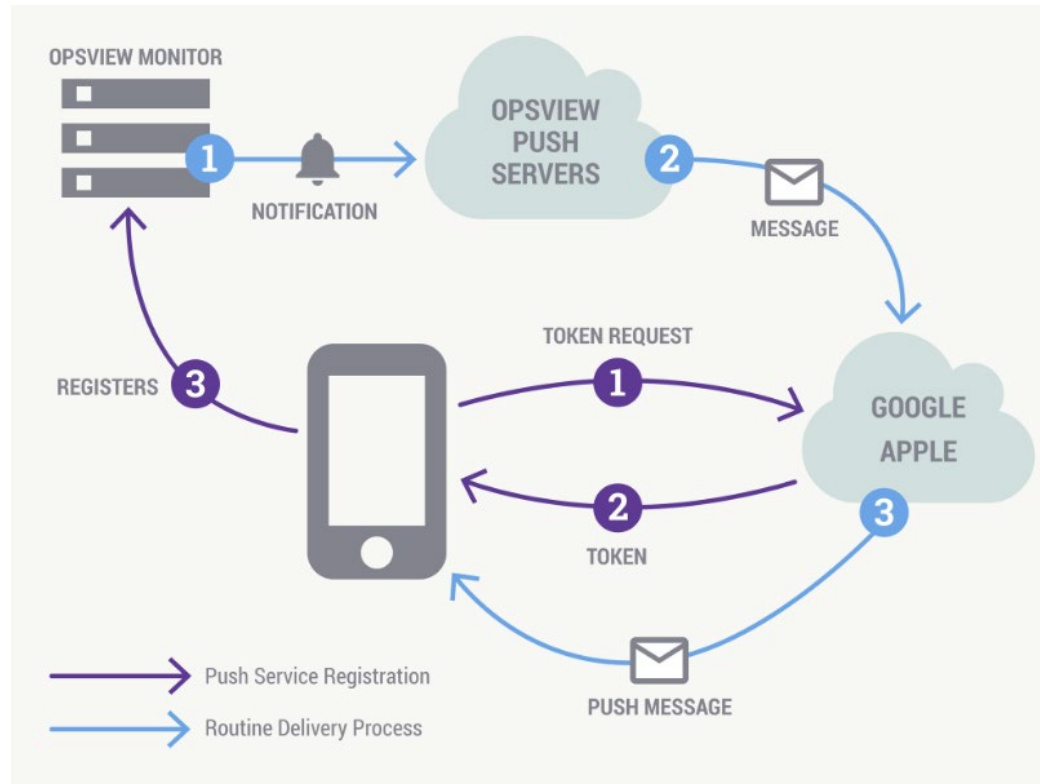
# Push Notification

## Push Notification Terms

- **Notification** – a message displayed to the user outside of the app's normal UI (i.e., the browser)
- **Push Message** – a message sent from the server to the client
- **Push Notification** – a notification created in response to a push message
- **Notifications API** – an interface used to configure and display notifications to the user
- **Push API** – an interface used to subscribe your app to a push service and receive push messages in the service worker
- **Web Push** – an informal term referring to the process or components involved in the process of pushing messages from a server to a client on the web
- **Push Service** – a system for routing push messages from a server to a client. Each browser implements its own push service.
- **Web Push Protocol** – describes how an application server or user agent interacts with a push service

<https://developers.google.com/web/ilt/pwa/introduction-to-push-notifications>

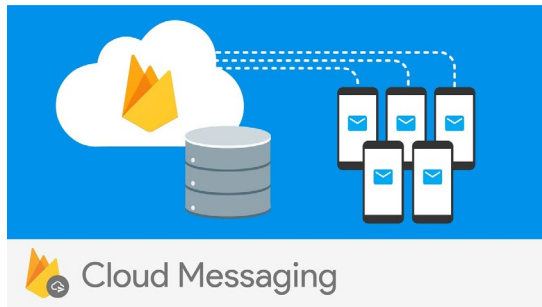
# Push Service



<https://capacitorjs.com/docs/apis/push-notifications>

<https://knowledge.opsview.com/docs/getting-started-with-push>

## Esempio di notifiche con Ionic e FireBase



Completamente free ma:

Maximum message rate to a single device

You can send up to 240 messages/minute and 5,000 messages/hour to a single device. This high threshold is meant to allow for short term bursts of traffic, such as when users are interacting rapidly over chat. This limit prevents errors in sending logic from inadvertently draining the battery on a device.

**Caution:** Do not routinely send messages near this maximum rate. This could waste end users' resources, and your app may be marked as abusive.

Upstream message limit

We limit upstream messages at 1,500,000/minute per project to avoid overloading upstream destination servers.

We limit upstream messages per device at 1,000/minute to protect against battery drain from bad app behavior.

<https://www.freecodecamp.org/news/how-to-get-push-notifications-working-with-ionic-4-and-firebase-ad87cc92394e/>

<https://capacitor.ionicframework.com/docs/guides/push-notifications-firebase/>

## Esempio di notifiche con FireBase per servizi backend

```
Node.js  Java  Python  Go  C#  REST

// This registration token comes from the client FCM SDKs.
var registrationToken = 'YOUR_REGISTRATION_TOKEN';

var message = {
  data: {
    score: '850',
    time: '2:45'
  },
  token: registrationToken
};

// Send a message to the device corresponding to the provided
// registration token.
admin.messaging().send(message)
  .then((response) => {
    // Response is a message ID string.
    console.log('Successfully sent message:', response);
  })
  .catch((error) => {
    console.log('Error sending message:', error);
  });
```

<https://firebase.google.com/docs/admin/setup>

<https://firebase.google.com/docs/cloud-messaging/send-message>

# Security

Malicious code on library



## Un buon inizio da leggere

If an attacker successfully injects any code at all, it's pretty much game over

XSS is too small scale, and really well protected against.

Chrome Extensions are too locked down.

Lucky for me, we live in an age where people install npm packages like they're popping pain killers.

I was excited at this point — I had a compelling package — but I didn't want to wait around while people slowly discovered it and spread the word. So I set about making PRs to existing packages that added my colourful package to their dependencies.

I've now made several hundred PRs (various user accounts, no, none of them as "David Gilbertson") to various frontend packages and their dependencies. "Hey, I've fixed issue x and also added some logging."

Look ma, I'm contributing to open source!

There are a *lot* of sensible people out there that tell me they don't want a new dependency, but that was to be expected, it's a numbers game.

<https://medium.com/hackernoon/im-harvesting-credit-card-numbers-and-passwords-from-your-site-here-s-how-9a8cb347c5b5>

## Un caso famoso

# Malicious code found in npm package event-stream downloaded 8 million times in the past 2.5 months



NOVEMBER 26, 2018 | IN [VULNERABILITIES](#) | BY DANNY GRANDER

A widely used npm package, `event-stream`, has been found to contain a malicious package named `flatmap-stream`. This was disclosed via a [GitHub issue](#) raised against the source repo.

<https://snyk.io/blog/malicious-code-found-in-npm-package-event-stream/>

`flatmap-stream` is a malicious package which was used in order to steal bitcoins from wallets. The malicious code was able to check if the `copydash` package was installed, and then attempt to steal the bitcoins stored in it. It was distributed by hijacking the popular `event-stream` package and adding `flatmap-stream` as a dependency.

<https://snyk.io/vuln/SNYK-JS-FLATMAPSTREAM-72637>

# Oauth 2

## Easy access delegation





# Oauth 2 rfc6749

## Si basa su un principio molto semplice:

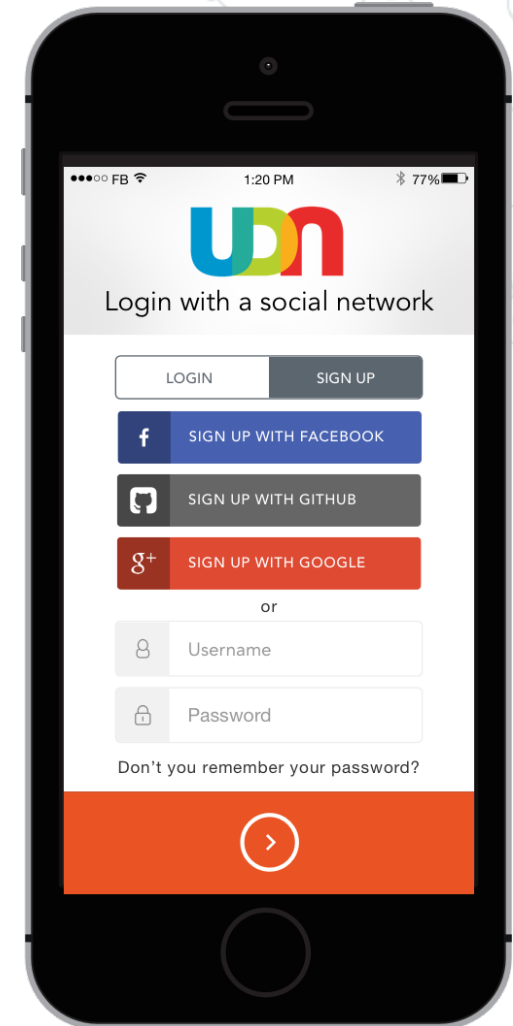
Garantire l'accesso ad applicazioni terze a delle risorse private senza condividere la propria password

## Perché non condividere la propria password?

- non si possono gestire livelli di autorizzazione differenti
- non si può garantire che l'autorizzazione venga utilizzata nel contesto scelto
- per revocare il permesso sono obbligato a cambiare password

OAuth è nato quindi con il presupposto di garantire l'accesso delegato ad un client specifico per determinate risorse sul server per un tempo limitato, con possibilità di revoca.

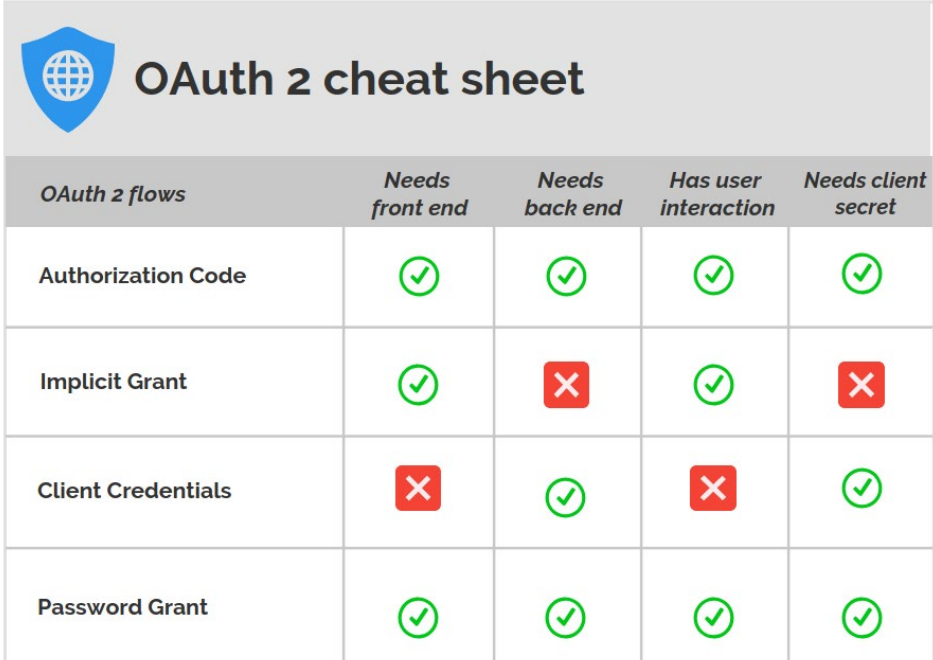
<https://it.wikipedia.org/wiki/OAuth>



# Oauth 2 rfc6749

Esistono differenti «flow» di autorizzazione descritti dal protocollo:

- **Authorization Code Grant**
- **Implicit Grant**
- **Client Credential Grant**
- **Password Grant**

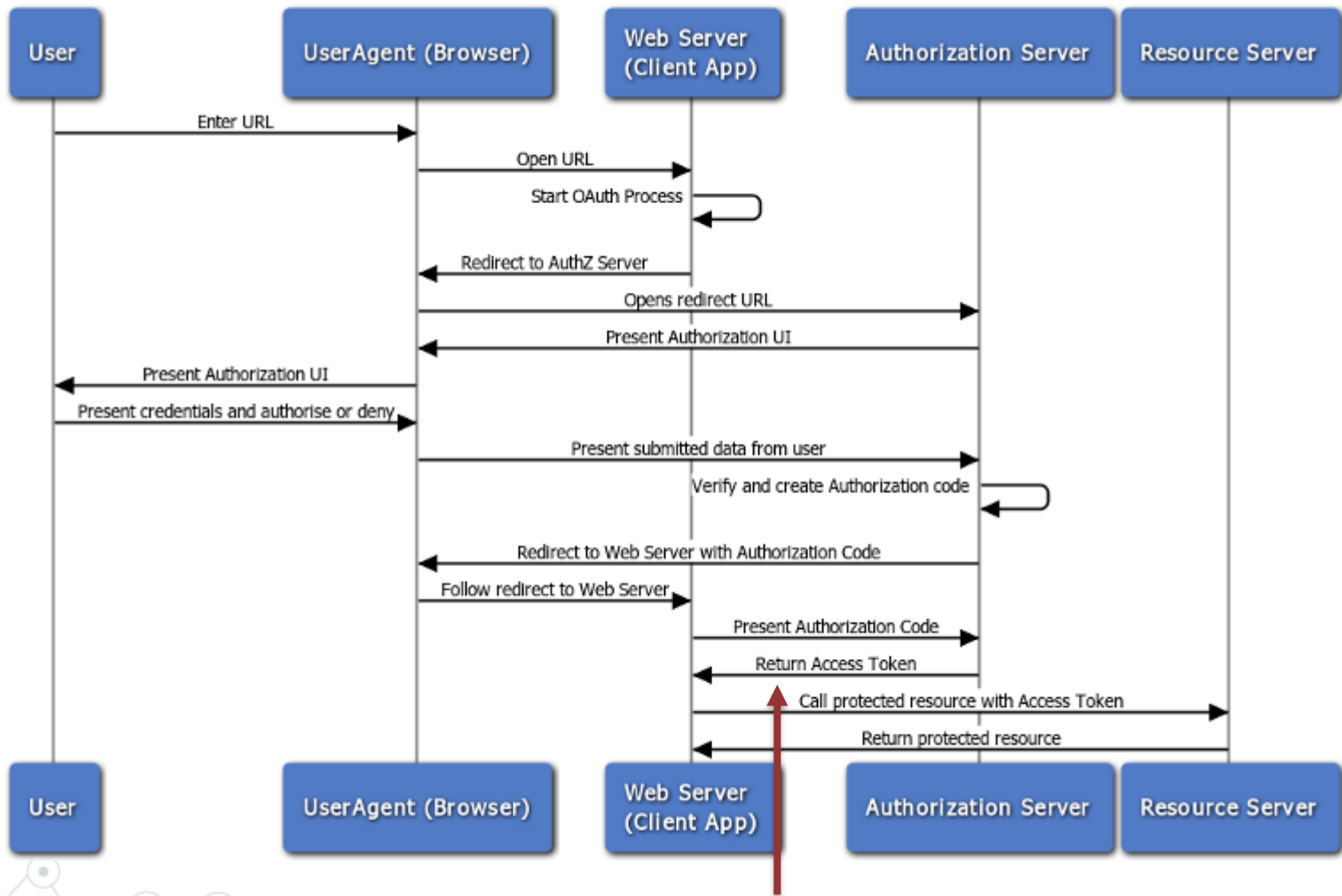


The image shows a cheat sheet for OAuth 2 flows. It features a blue shield icon with a globe inside, followed by the title "OAuth 2 cheat sheet". Below the title is a table with five columns: "OAuth 2 flows", "Needs front end", "Needs back end", "Has user interaction", and "Needs client secret". The rows represent four different grant types: Authorization Code, Implicit Grant, Client Credentials, and Password Grant. Each cell in the table contains either a green checkmark (✓) or a red X (✗) to indicate the requirements for each flow.

<i>OAuth 2 flows</i>	<i>Needs front end</i>	<i>Needs back end</i>	<i>Has user interaction</i>	<i>Needs client secret</i>
Authorization Code	✓	✓	✓	✓
Implicit Grant	✓	✗	✓	✗
Client Credentials	✗	✓	✗	✓
Password Grant	✓	✓	✓	✓

<https://itnext.io/an-oauth-2-0-introduction-for-beginners-6e386b19f7a9>

# Oauth 2: Authorization Code Flow



Bearer Tokens are the predominant type of access token used with OAuth 2.0. A Bearer Token is an opaque string, not intended to have any meaning to clients using it.

## Oauth 2: Complicato?



<https://auth0.com/pricing/>



Firebase Authentication

<https://firebase.google.com/pricing>

<https://auth0.com/blog/ionic-framework-how-to-get-started/>

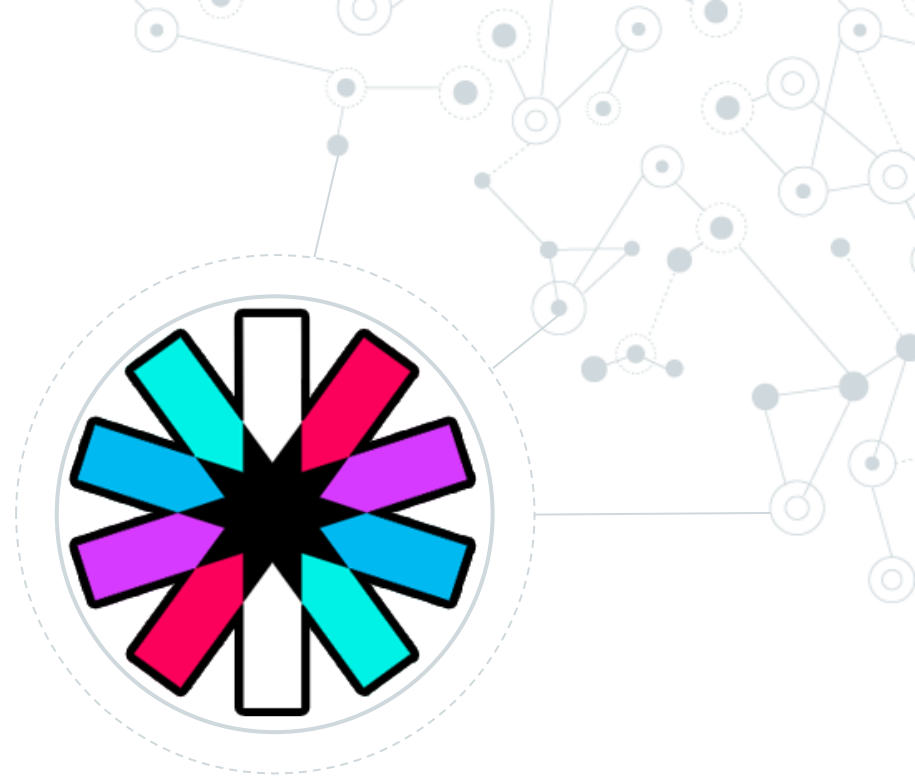
<https://auth0.com/docs/quickstart/spa/angular2/01-login>

<https://github.com/angular/angularfire>

<https://github.com/angular/angularfire/blob/master/docs/auth/getting-started.md>

# JWT

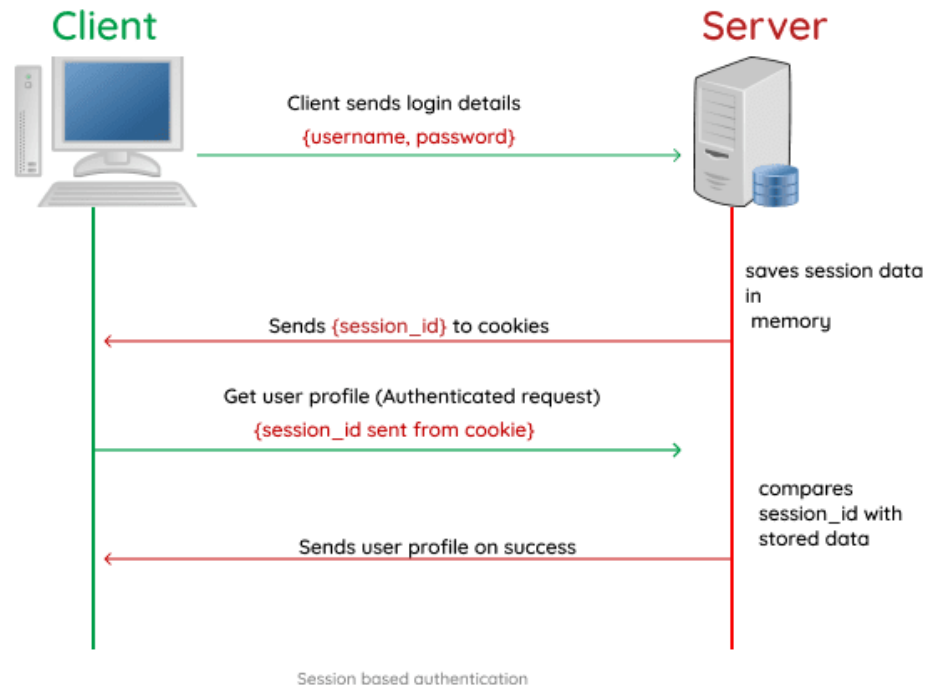
JWTs can be used as OAuth 2.0 [Bearer Tokens](#)



# JSON Web Token (JWT) rfc7523

## Perché è stato introdotto?

### Utilizzo classico delle sessioni



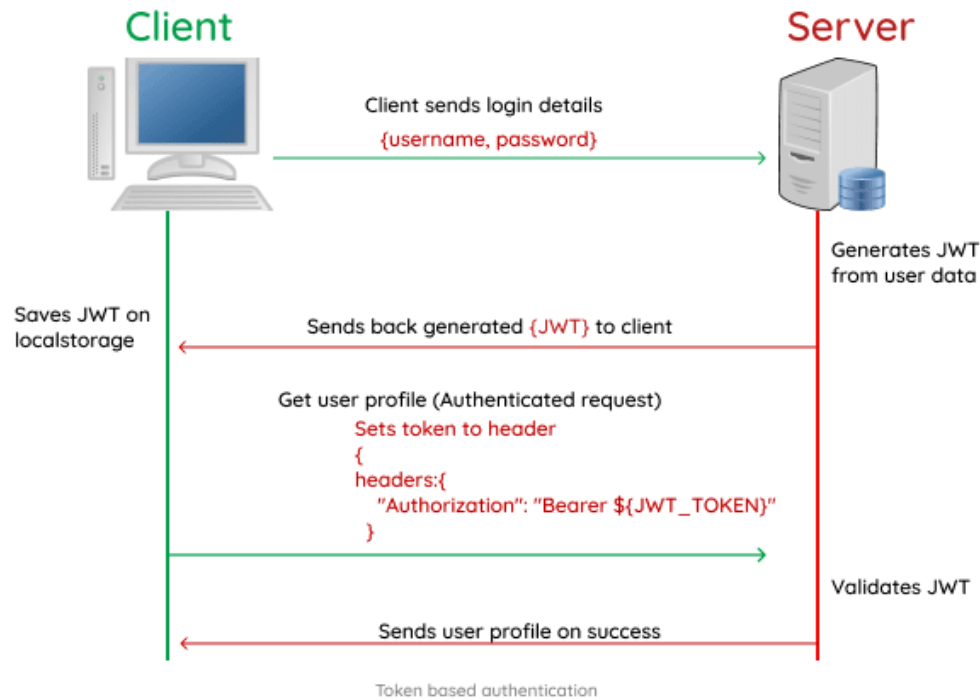
### Svantaggio delle sessioni:

- Devo andare sul database a verificare la validità della sessione utente
- Nelle architetture a microservizi l'uso della sessione non è agevole
- Non scalabile con architetture a cluster
- Su una SPA ho un maggiore tempo di sviluppo rispetto ad architetture server MVC

# JSON Web Token (JWT) rfc7523

## Perché è stato introdotto?

### Utilizzo del token



### Differenze?

- Non ho storage di sessioni
- Non devo gestire sessioni «morte» lato server
- I servizi possono essere realmente statefull

Ok ma dove è la vera differenza?

# JSON Web Token (JWT) rfc7523

<https://jwt.io/>

Cosa posso mettere nel JWT?

- Informazioni riguardante l'utente
- Informazioni sui permessi dell'utente
- Una data di scadenza
- Una signature per validare il JWT
- Qualsiasi altra informazione

**NIENTE PASSWORD NEL JWT!**

JWT  
JSON WEB TOKEN



HEADER  
ALGORITHM  
& TOKEN TYPE

```
{  
  "alg": "HS256",  
  "typ": "JWT"  
}
```

+

PAYLOAD  
DATA

```
{  
  "sub": "1234567890",  
  "name": "John Doe",  
  "admin": true  
}
```

+

SIGNATURE  
VERIFICATION

```
HMACSHA256(  
  base64UrlEncode(header) + "." +  
  base64UrlEncode(payload),secretKey)
```

NORDICAPIS.COM

Lo scopo di un JWT non è di crittografare i dati, quindi evitare la lettura di dati sensibili durante il trasporto (esiste SSL), ma consente alla parte ricevente di fidarsi che i dati ricevuti sono rimasti inalterati durante il trasporto.





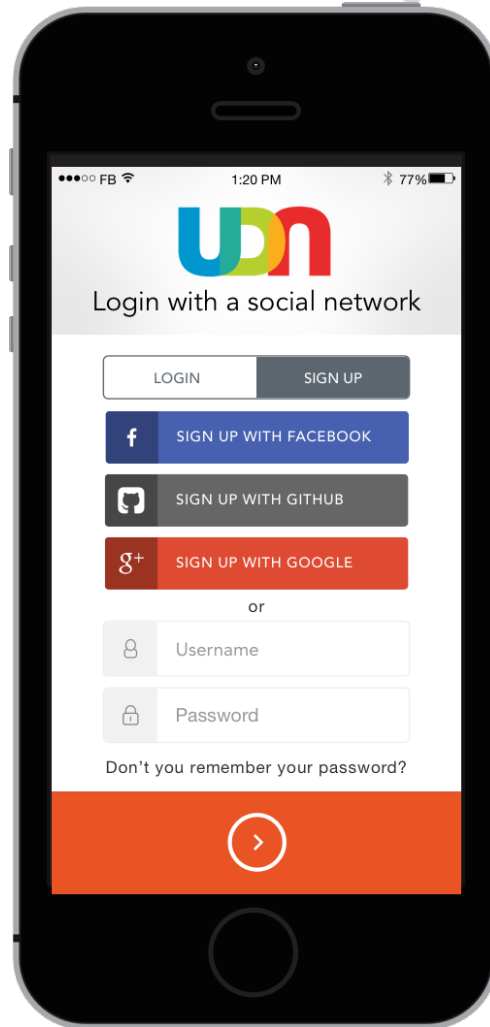
# Mobile Services

(aggiungere rapidamente servizi alla propria app)

<https://market.ionicframework.com/>



# Auth Service



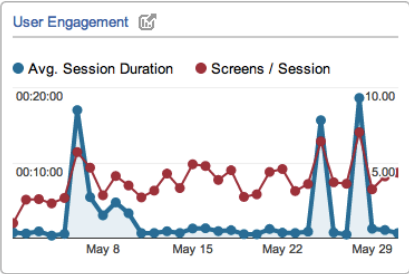
<https://auth0.com/blog/ionic-framework-how-to-get-started/>

<https://firebase.google.com/docs/auth/>

# Analytics Service



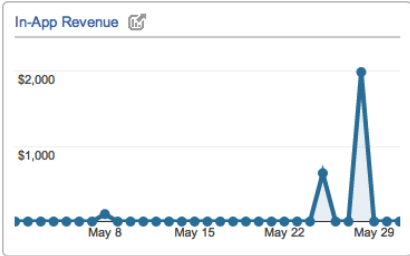
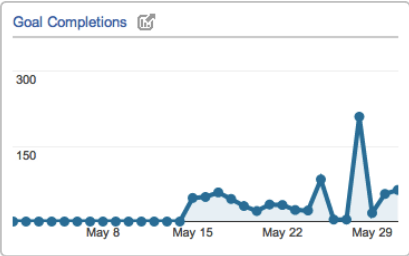
## Engagement



Screens

Screen Name	Screen Views
AnalyticsMainActivity	17,669
Profile Picker	12,299
Line Chart Settings	3,259
Alert Viewer	3,222
Login	1,891

## Outcomes



<https://ionicframework.com/docs/native/google-analytics/>

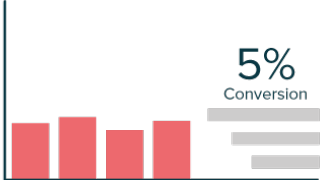
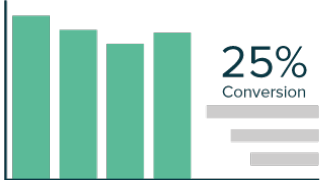
# A/B Test Service

✓ A



VS.

✗ B



<https://github.com/optimizely/optimizely-cordova-plugin>

## Signature

Componente standard Angular:

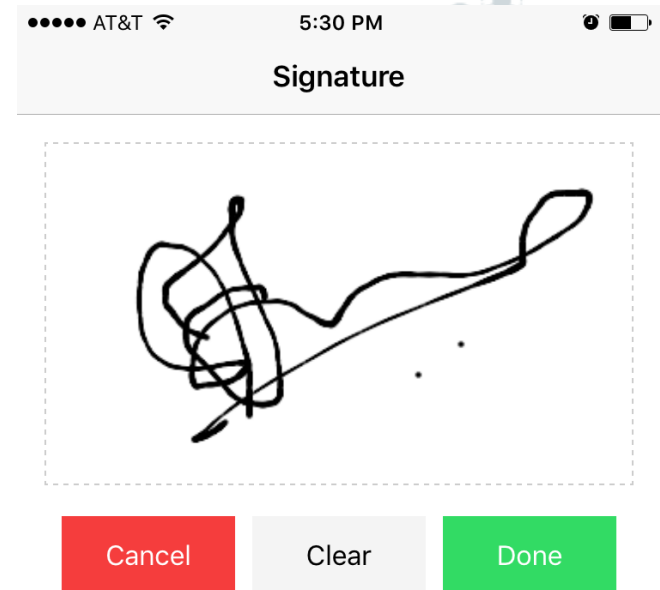
[https://www.npmjs.com/package/signature\\_pad](https://www.npmjs.com/package/signature_pad)

<https://github.com/wulfsocket/angular2-signaturepad>

Basato su HTML5 Canvas

Integrato in Ionic 3:

<https://github.com/srinivastamada/ionic3-angular4-signaturepad>



# Barcode / QR Code

<https://ionicframework.com/docs/native/barcode-scanner/>

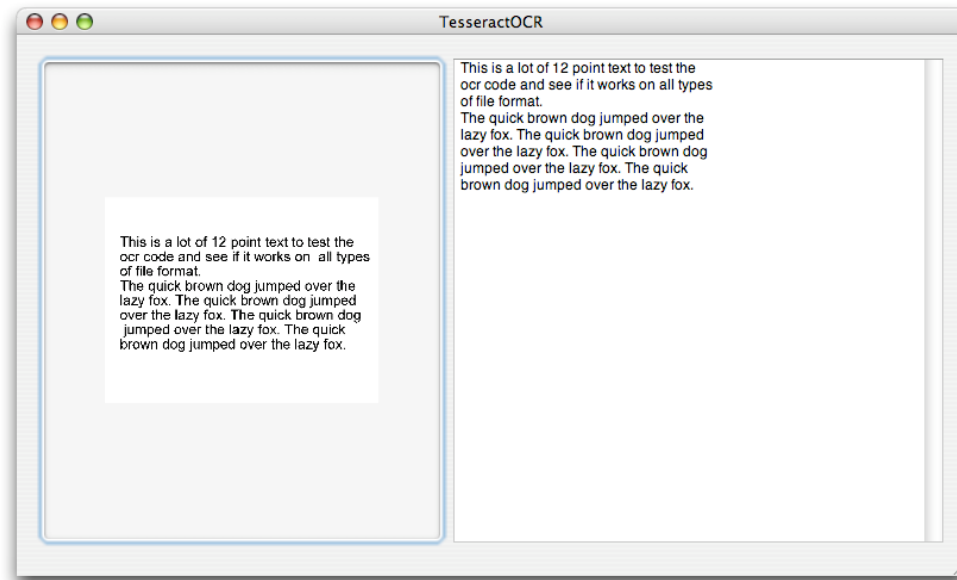
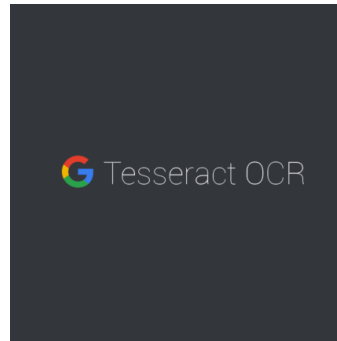
<https://www.scandit.com/>

<https://www.scandit.com/scandit-launches-matrixscan-a-first-of-its-kind>



pabilit

# OCR



<https://github.com/gustavomazzoni/cordova-plugin-tesseract>  
[https://www.youtube.com/watch?v=NF\\_nnoA0aXM](https://www.youtube.com/watch?v=NF_nnoA0aXM)



# AR

- **Marker Based Augmented Reality:** si utilizzano marker visuali e la camera per attivare la realtà aumentata. Da alcuni anni si possono utilizzare marker complessi come immagini.
- **Markerless Augmented Reality:** si utilizzano sensori come GPS, Bussola, Accelerometro per comprendere lo spazio
- **Projection Based Augmented Reality:** si proiettano informazioni su una superficie e in alcuni casi si interagisce con l'utente
- **Superimposition Based Augmented Reality:** l'immagine sintetica sostituisce o integra l'immagine reale








AR



# SmartGlasses



<b>MOVERIO BT-300</b> <b>849,00 €</b>	 Panoramica	 Specifiche tecniche	 Accessori	 Assistenza	 Recensioni
Piattaforma Android					
Sistema operativo		Android 5.1			

<https://www.wikitude.com/products/eyewear/epson-augmented-reality-sdk/>

<https://www.vuforia.com/devices.html>

SmartGlasses

UP  SKILL

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

# Posizionamento Indoor

## Trasmissione broadcast

- Beacon: trasmissione Bluetooth Low-Energy «del solo» UDDI
- Eddystone: trasmissione Bluetooth Low-Energy di UDDI e URL



# Posizionamento Indoor

Fine Timing Measurement (FTM) protocol from [IEEE 802.11-2016](https://www.ieee.org/standards/publications/802.11-2016).

The Wi-Fi Alliance's system functions when mobile devices and access points share data. Radio waves travel through the air at a predictable speed—the speed of light

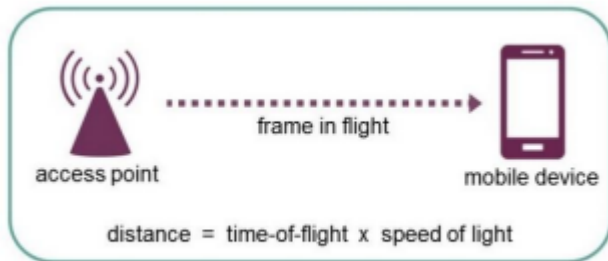


Figure 1. Basic transmission time calculation

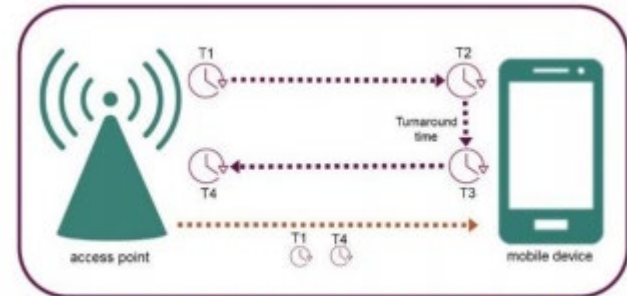


Figure 2. Round-trip timestamps synchronize to same clock

- Client can request an AP share its location (e.g. in latitude / longitude or as a civic address). The program is designed to cover situations whereby such information can be shared pre-association or post association (so an AP may have the ability to share its location to Clients that are not connected to that AP).

<https://www.wi-fi.org/beacon/rolf-de-vegt/never-lost-indoors-the-promise-of-wi-fi-location>

## Animation



### **Lottie**

Easily add high-quality animation to any native app.

Lottie is an iOS, Android, and React Native library that renders After Effects animations in real time, allowing apps to use animations as easily as they use static images.

<https://github.com/yannbf/ionic-lottie>

# Game Engine

Si basano su due tecnologie:

Canvas: una estensione dell'HTML standard che permette il rendering dinamico di immagini bitmap gestibili attraverso un linguaggio di scripting.

WebGL: abilita l'utilizzo delle librerie OpenGL all'interno di un Canvas

<http://madebyevan.com/webgl-water/>

<http://www.larsberg.net/#/hexanemone>



## Game Engine



<http://phaser.io/examples/v2/animation/group-creation>

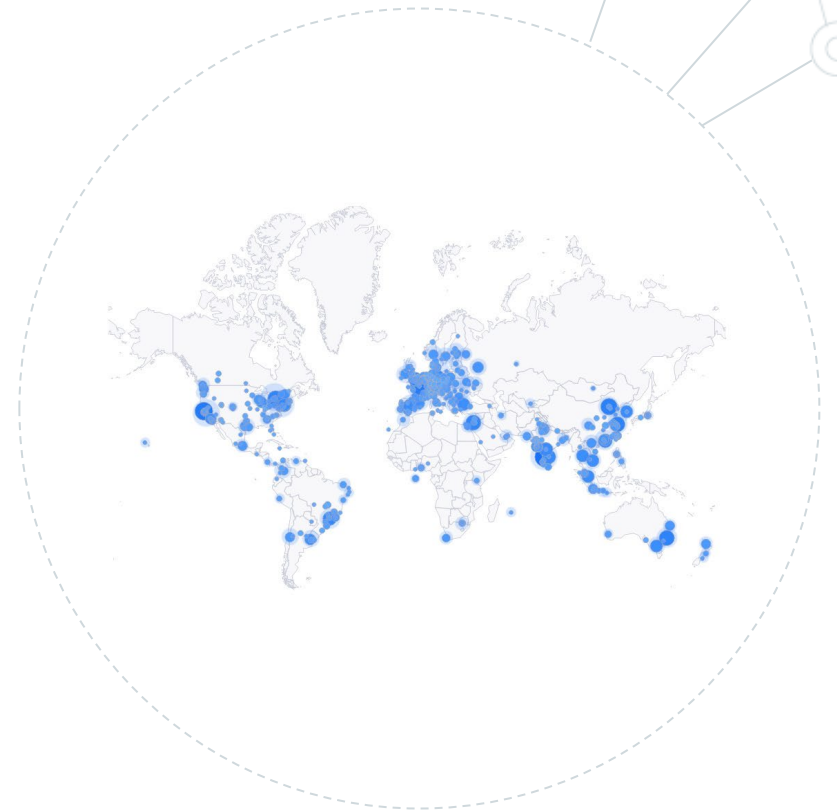
<http://phaser.io/examples/v2/box2d/car-on-terrain>

<https://github.com/photonstorm/phaser-ce/tree/master/resources/Project%20Templates/ionic-example>

## Ionic Survey

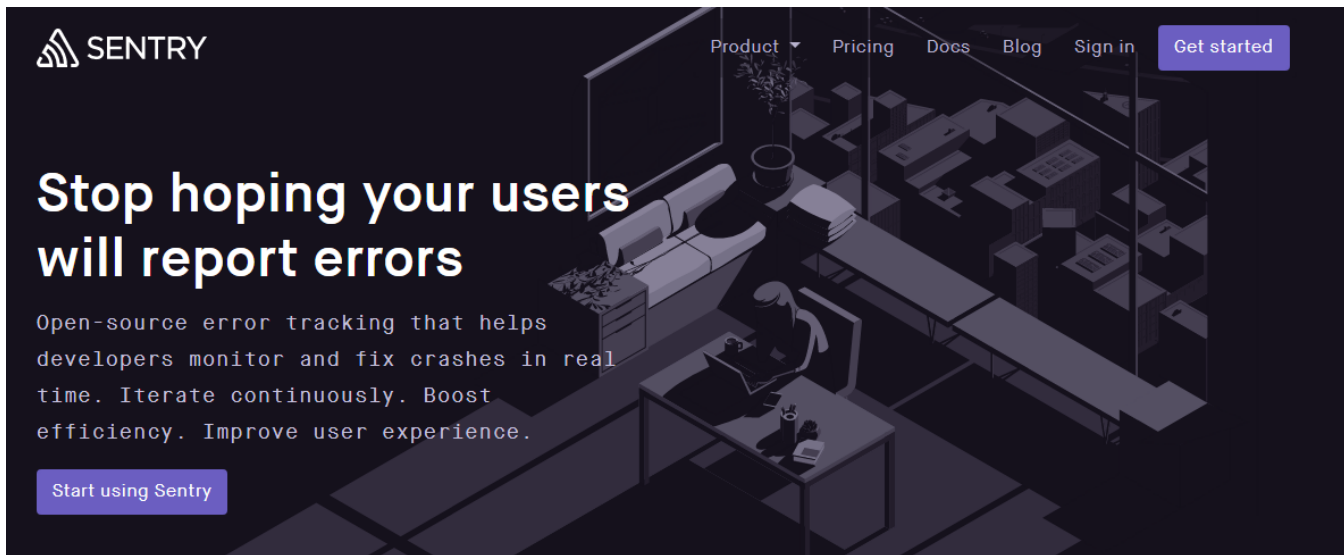
Impariamo dalla community

<https://ionicframework.com/survey/2017#>



## Logger / Crash Service

**La mia applicazione è installata su 10 mila device. Sono sicuro che tutto funzioni come avevo previsto?**



The image shows the Sentry website landing page. At the top left is the Sentry logo. The navigation menu includes 'Product', 'Pricing', 'Docs', 'Blog', 'Sign in', and a 'Get started' button. The main headline reads 'Stop hoping your users will report errors'. Below this, a paragraph describes Sentry as an open-source error tracking service that helps developers monitor and fix crashes in real time. A 'Start using Sentry' button is located at the bottom left of the main content area. The background features an isometric illustration of a modern office interior with a person working at a desk.





**SENTRY**

Product Pricing Docs Blog Sign in [Get started](#)

# Stop hoping your users will report errors

Open-source error tracking that helps developers monitor and fix crashes in real time. Iterate continuously. Boost efficiency. Improve user experience.

[Start using Sentry](#)

 <p>Crashlytics ★★★★★ (63) <a href="#">GET A QUOTE</a> <input type="checkbox"/> Compare</p>	 <p>Instabug ★★★★★ (40) <a href="#">TRY FOR FREE</a> <input type="checkbox"/> Compare</p>	 <p>Bugsee ★★★★★ (12) <a href="#">GET A QUOTE</a> <input type="checkbox"/> Compare</p>	 <p>Sentry ★★★★★ (23) <a href="#">GET A QUOTE</a> <input type="checkbox"/> Compare</p>
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

# Logger / Crash Service

**Captain Planet / Heart** ⌵





ISSUES   EVENTS   OVERVIEW   USER FEEDBACK   RELEASES

★ Star   📶 Subscribe   ⚙️ Settings

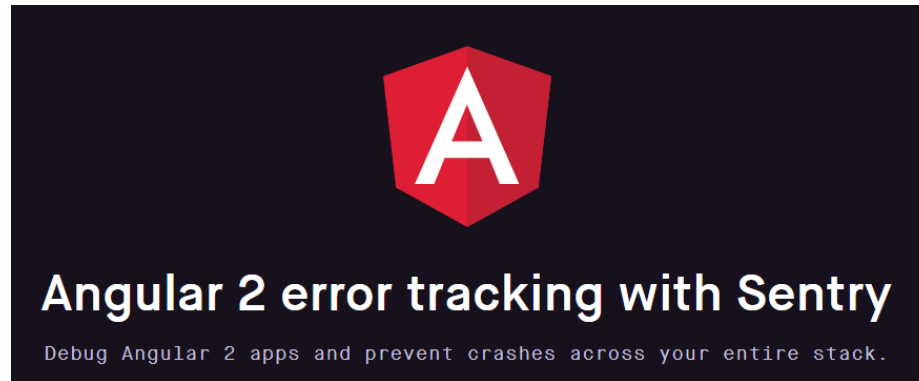
Unresolved Issues ⌵

Sort by: Last Seen ⌵   🔍 is:unresolved ⌵   🔄

GRAPH: **24H**   14D   EVENTS   USERS

<input type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<b>Error</b> <b>TypeError</b> poll(../sentry/scripts/views.js) Object [object Object] has no method 'updateFrom' HEART-1D   🕒 6 days ago — 4 months old   🗨️ 1	 <span>⌵</span>	-----	26	1
<input type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<b>Error</b> ★ <b>javax.servlet.ServletException</b> org.hsqldb.jdbc.Util in throwError Something bad happened HEART-1G   🕒 6 days ago — 4 months old	 <b>Chris Jennings</b>	-----	26	1
<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<b>Error</b> <b>script-src</b> example.com Blocked 'script' from 'example.com' HEART-1K   🕒 6 days ago — 4 months old	 <span>⌵</span>	-----	26	1
<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<b>Error</b> <b>ZeroDivisionError</b> bin/raven in <main> divided by 0 HEART-1H   🕒 6 days ago — 4 months old	 <span>⌵</span>	-----	26	1

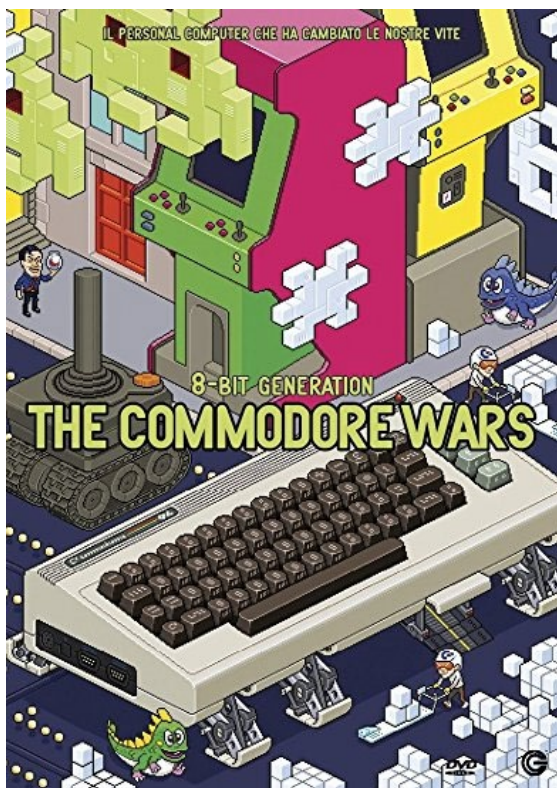
## Sentry per web e ionic



<https://sentry.io/organizations/humancare/issues/1259950838/?project=1536259&query=is%3Aunresolved>

<https://sentry.io/for/angular2/>

<https://docs.sentry.io/platforms/javascript/ionic/>



# OT: Come gestire le password



## Sicurezza

A decorative network diagram in the top right corner, consisting of various sized circles (nodes) connected by thin lines (edges). Some nodes are solid grey, while others are hollow with a dashed border. The connections form a complex, interconnected web.

No matter how secure you think you might be, something malicious can always happen. Because, "***With the right tools and Talent, a Computer is an open book.***"

Joanna Rutkowska

A decorative network diagram in the bottom left corner, similar to the one in the top right, featuring a cluster of nodes and connecting lines.



## Sicurezza

Sono riuscito a violare un Sistema. Cosa faccio?

1. Apertura file wp-config.php (wordpress) o configuration.php (joomla)
2. Individuazione delle informazioni in chiaro della connessione al mysql
3. Esecuzione di uno script per il dump del DB
4. Download del dump in locale

Password in chiaro:

id	username	password	passwordHint
1	admin	1337	k3w1 dud
2	pumpkin22	halloween	my favorite holiday
3	johndoe	queen	Freddie Mercury's band
4	alexa45	password	password
5	guy	123456	<i>NULL</i>
6	maryjane	queen	I'm one!
7	dudson123	halloween	scary movie!

# Sicurezza

MD5 : funzione di hash non reversibile

Password = MD5>PasswordInseritaDallUtente);

Password crittografate:

id	username	password	passwordHint
1	admin	7E7274BAC45E467C5AB832170F12E418	k3wl dud
2	pumpkin22	5377DBF76D995CC213ED76924A31CB13	my favorite holiday
3	johndoe	512239D9AE0C3B5567DE188739F689F2	Freddie Mercury's band
4	alexa45	2FE5421E49061F8225C2FB7CB81980FD	password
5	guy	ABE35E2827DDA834C9612FE9E9C92CE0	NULL
6	maryjane	198670893B2781C83F3DA5D45150123D	I'm one!
7	dudson123	59E2113217E65B9885F9DA73FDC5697B	scary movie!

Potrei avere un db ti migliaia di hash generati da password conosciuti e scoprire le password.

## Sicurezza

Secret: Bdy~)]/S%@QgSHYH^MdO3&>c9q\*2#i

Password = MD5(PasswordInseritaDallUtente + **Secret**);

Password crittografate:

id	username	password	passwordHint
1	admin	7E7274BAC45E467C5AB832170F12E418	k3wl dud
2	pumpkin22	5377DBF76D995CC213ED76924A31CB13	my favorite holiday
3	johndoe	512239D9AE0C3B5567DE188739F689F2	Freddie Mercury's band
4	alexa45	2FE5421E49061F8225C2FB7CB81980FD	password
5	guy	ABE35E2827DDA834C9612FE9E9C92CE0	NULL
6	maryjane	198670893B2781C83F3DA5D45150123D	I'm one!
7	dudson123	59E2113217E65B9885F9DA73FDC5697B	scary movie!

Non posso più utilizzare tabelle di password conosciute perché la Secret è differente dalla mia. Dovrei rigenerarmi tutta la mia tabella di password conosciute con la Secret.

# Sicurezza



Individuo nei file php la Secret usata da wordpress/joomla.  
Utilizzare un dizionario di password più utilizzate per essere più veloce  
e generare una lista di password da confrontare con quella del db

# Sicurezza

Secret: Bdy~)]/S%@QgSHYH^MdO3&>c9q\*2#i

Salt: differente per ogni utente

Password = MD5>PasswordInseritaDallUtente + **Secret** + **Salt**);

```
SELECT Username, PasswordHash, Salt FROM dbo.[User]
```

	Username	PasswordHash	Salt
1	User1	104f4807e28e401c1b9e1c43ac80bdde	nkV38+eHsl=
2	User2	827e877ba7a4676ee4903f2b60de13a	NwHowZ63RVw=
3	User3	e901b26b3ec928db2753150d04736c44	Z8uDOFE90gE=
4	User4	72997d54dbe748964c64656cba01e1c8	SKXPm84F2bU=
5	User5	9207f5635d2622e94e2a67b0190c89a8	ppjsgG33nl=
6	User6	07168a0e6f3102a6ee3df50f3355d49c	vINyqVBbtPU=
7	User7	d78c6606bed3d2e4262df59b29e0bfc2	pQQdD514l/E=
8	User8	c71dcf5a4be211294014537c255ac48a	v-x3ypPTCg=
9	User9	2ad3269ee1f97858f7f236a02b3a32e	SOwixgcWgvA=
10	User10	bb0ae47e5b95b896568bc014ac63b9c1	+Bz6pl/G6DQ=
11	User11	b72c7ec38b64ca39fee15a931f3f5260	UDfOAdDyQQQ=
12	User12	2e658552d8fe83cd7820bff7b2cee7	fvhDCo17aAk=
13	User13	c5cef9d547088594e022a6581bc44ea6	YaDJlrHZMnk=
14	User14	ab9a873186c52d0daf11c8a193dc6f9c	8cLo46CTPUE=
15	User15	30027afd712c3cc235459a0f1a45bea5	bLSAogm+RT4=
16	User16	50e195fd70d53dc0072e56e54f17f50	7yBcpKnRkpc=
17	User17	096946878b485dc156d6e0f9e1e10160	i9C8NzVdtDo=
18	User18	10227757e7d18f0c3578c9fa2a4502	w85scq8Dlwo=
19	User19	cdc3e906dd07fad0f8e4969bc5f46e8c	tu6RYS8silk=
20	User20	9b153dde1510c64fce08a6f28b940b55	8teTAorVIE=
21	User21	fa67c40b1d4317078218614154d3f2e7	HV8DjZ9Uz8=
22	User22	7e533c1aee2145aa25108c3f3beb5bb	R3+QkFNyAFg=
23	User23	45b4d6d24fd79ed62752db188d2c5803	OprSkliq1DN4=
24	User24	d7755518f9b08f784c179a456764d5	r68o84BpQCg=
25	User25	4dc0eef0baf49af20ba51eb0d7d4155b	faSa7MGRwis=

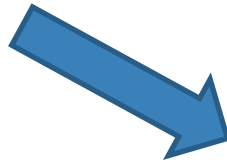
- Individuo il Salt per ogni utente e devo rieseguire l'hash del mio dizionario Per ogni combinazione di salt. Poi confronto il risultato con il db

# Sicurezza

MD5 è sicuro?



E' irreversibile



E' efficiente

## MD5 for passwords

93

Using salted md5 for passwords is a bad idea. Not because of MD5's cryptographic weaknesses, but because it's fast. This means that an attacker can try **billions** of candidate passwords per second on a single GPU.

What you should use are deliberately slow hash constructions, such as `scrypt`, `bcrypt` and `PBKDF2`. Simple salted SHA-2 is not good enough because, like most general purpose hashes, it's fast. Check out [How to securely hash passwords?](#) for details on what you should use.

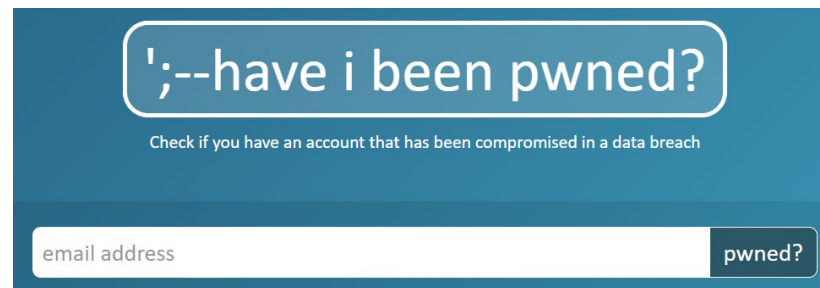
# Sicurezza

## Scoprite se siete stati **pwned**

A corruption of the word "Owned." This originated in an online game called **Warcraft**, where a map designer misspelled "owned." When the computer beat a player, it was supposed to say, **so-and-so** "has been owned."

Instead, it said, so-and-so "has been pwned."

<https://haveibeenpwned.com/>



!;--have i been pwned?

Check if you have an account that has been compromised in a data breach

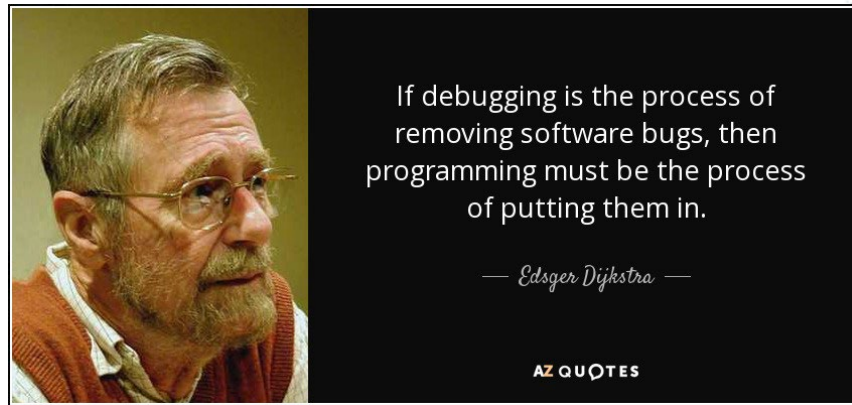
email address pwned?

Unit Test  
Integration Test  
E2E Test





# Test



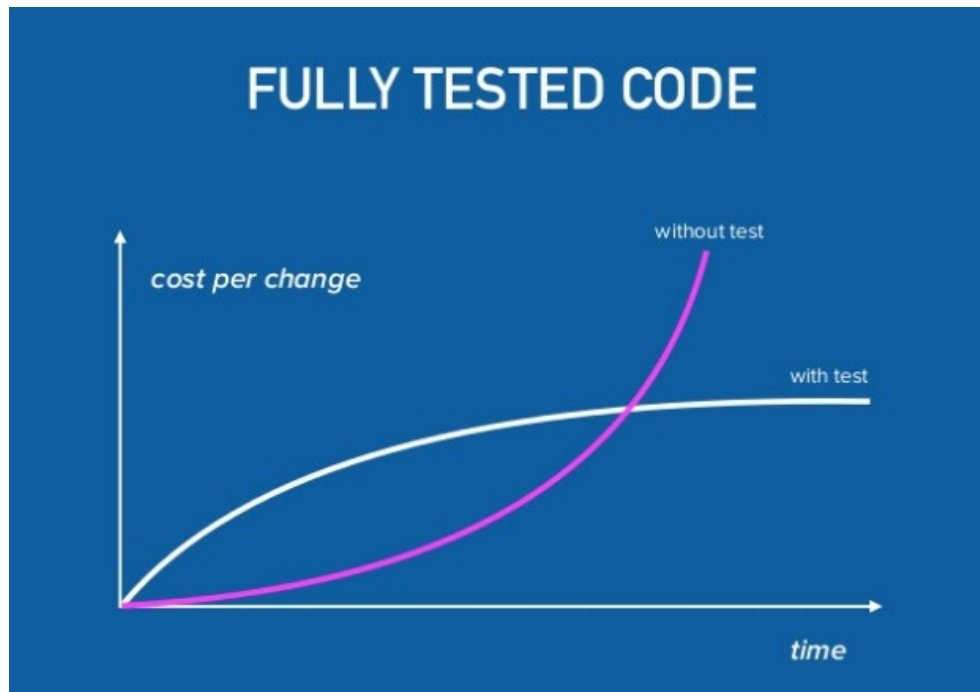
Il test di un programma può essere usato per mostrare la presenza di bug, ma mai per mostrare la loro assenza.

```
public class MyUnit {  
  
    public String concatenate(String one, String two){  
        return one + two;  
    }  
}
```

```
import org.junit.Test;  
import static org.junit.Assert.*;  
  
public class MyUnitTest {  
  
    @Test  
    public void testConcatenate() {  
        MyUnit myUnit = new MyUnit();  
  
        String result = myUnit.concatenate("one", "two");  
  
        assertEquals("onetwo", result);  
    }  
}
```

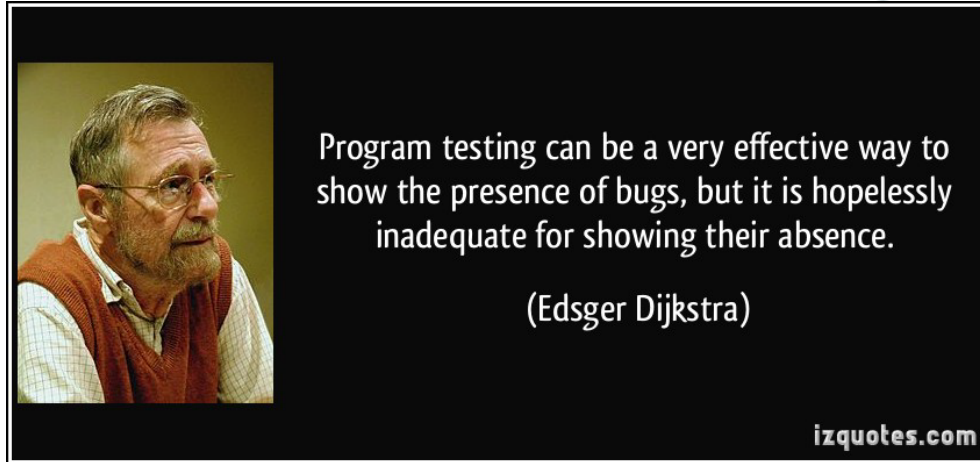
# Test

- Facilitano la modifica
- Il test fallisce prima di rilasciare il software
- Meno sorprese
- Documentazione migliore



<https://www.slideshare.net/spleenteo/to-test-or-not-to-test-this-is-the-prblem>

# Test



## **Unit Test:**

Test unitari e isolati: permettono di testare singole parti del codice in maniera isolata. Devono essere semplici e veloci.

## **Integration Test:**

Test di integrazione di vari moduli software per capire se qualcosa va male durante il loro uso combinato.

## **E2E Test (End 2 End Test):**

Test dove automaticamente eseguo attività utilizzando la stessa interfaccia «grafica» che utilizzerà l'utente finale.

# Test

Aulos / Loccioni-Aulos-CSharp / Develop

#3477 (31 May 18 15:01) |

Overview Changes Tests Build Log Parameters Dependencies Artifacts NuGet Packages

Run Actions Edit Configuration Settings

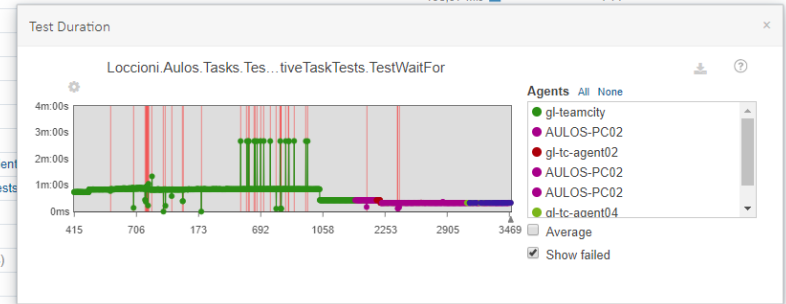
#3475 | All history | Last recorded build

Total test count: 1964 (4 ignored), total duration: 10m:06s

Download all tests in CSV Permalink

View: tests containing: with: any status Filter Show: 20 Items

Status	Test	Duration	Order#
OK	PreemptiveTaskTests.TestWaitFor   (Loccioni.Aulos.Tasks.Tests.dll Loccioni.Aulos.Tasks.Tests)	19s,974ms	744
OK	PreemptiveTaskTests.TestWaitingSharedTask   (Loccioni.Aulos.Tasks.Tests.dll Loccioni.Aulos.Tasks.Tests)		
OK	ProgramTest.ExecutionOfForProgramTest   (Loccioni.Aulos.Programs.Tests.dll Loccioni.Aulos.Programs.Tests)		
OK	PreemptiveTaskTests.TestWaitForPerformance   (Loccioni.Aulos.Tasks.Tests.dll Loccioni.Aulos.Tasks.Tests)		
OK	ProgramTest.ComplexityCheckTest   (Loccioni.Aulos.Programs.Tests.dll Loccioni.Aulos.Programs.Tests)		
OK	ProgramTest.TestProgramExecutionsToDontShareInstructions   (Loccioni.Aulos.Programs.Tests.dll Loccioni.Aulos.Programs.Tests)		
OK	PreemptiveTaskTests.TestCascadeWaitForTasks   (Loccioni.Aulos.Tasks.Tests.dll Loccioni.Aulos.Tasks.Tests)		
OK	ExecutionClientTest.ProgramExecutionEventsTest   (Loccioni.Aulos.Programs.WebClient.Tests.dll Loccioni.Aulos.Programs.WebClient.Tests)		
OK	ParameterMapperTest.TestSubParameterMappingToDTOWithOutForeachEnumeration   (Loccioni.Aulos.TransferModel.Mapping.Tests.dll Loccioni.Aulos.TransferModel.Mapping.Tests)		
OK	PreemptiveTaskTests.TestWaitForStartTasks   (Loccioni.Aulos.Tasks.Tests.dll Loccioni.Aulos.Tasks.Tests)		
OK	ConditionClockTest.ConstructorMultiShotTest   (Loccioni.Aulos.Tests.dll Loccioni.Aulos.Tests.Conditions)		
OK	ExecutionClientTest.AbortExecutionsTest   (Loccioni.Aulos.Programs.WebClient.Tests.dll Loccioni.Aulos.Programs.WebClient.Tests)		
OK	ProgramTest.ExecutionOfWhileProgramTest   (Loccioni.Aulos.Programs.Tests.dll Loccioni.Aulos.Programs.Tests)		
OK	RoslynScriptExecutorTest.TestExecuteScript   (Loccioni.Aulos.Scripting.Tests.dll Loccioni.Aulos.Scripting.Tests)	5s,541ms	594
OK	AlarmsClientTest.AlarmNotificationsTest   (Loccioni.Aulos.Messages.InProcessClient.Tests.dll Loccioni.Aulos.Messages.InProcessClient.Tests)	5s,467ms	274
OK	PreemptiveTaskTests.TestWaitingSharedTaskWithInnerWaits   (Loccioni.Aulos.Tasks.Tests.dll Loccioni.Aulos.Tasks.Tests)	5s,248ms	762
OK	PreemptiveTaskTests.TestWaitingSharedTaskInDifferentThreads(True)   (Loccioni.Aulos.Tasks.Tests.dll Loccioni.Aulos.Tasks.Tests)	5s,165ms	760
OK	PreemptiveTaskTests.TestWaitingSharedTaskInDifferentThreads(False)   (Loccioni.Aulos.Tasks.Tests.dll Loccioni.Aulos.Tasks.Tests)	5s,165ms	761
OK	MachineStateMessagesClientTest.GetMachineStateMessagesTest   (Loccioni.Aulos.Messages.WebClient.Tests.dll Loccioni.Aulos.Messages.WebClient.Tests)	5s,008ms	406
OK	ReminderClientTest.GetRemindersTest   (Loccioni.Aulos.Messages.WebClient.Tests.dll Loccioni.Aulos.Messages.WebClient.Tests)	4s,712ms	414



1 2 3 4 5 6 7 8 9 ... 99

# Test in Ionic

Esistono molti progetti «seed» che mostrano come integrare unit e e2e test:

<https://github.com/ionic-team/ionic-unit-testing-example>

## Getting Started with this Project

---

To get started, clone this repo, and run `npm install` in the root directory.

```
git clone https://github.com/ionic-team/ionic-unit-testing-example.git
cd ionic-unit-testing-example
npm install
```

Then, you should run `ionic serve` to make sure the project loads.

## Unit Tests

To run the tests, run `npm run test`.

See the example test in `src/app/app.component.spec.ts` for an example of a component test.

## End-To-End Tests (Browser-Only)

To serve the app, run `ionic serve`.

To run the end-to-end tests, run (while the app is being served) `npm run e2e`.

See the example end-to-end test in `e2e/app.e2e-spec.ts`.

## Test nel mondo mobile

Come posso testare la mia applicazione (web o mobile)  
Su tutti i dispositivi?

