

Seminar paper from the course "Seminar from BIS"
about

„Webbrowser
—
History, Concepts, Market“

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FS – Head: ao.Univ.Prof. Dr. Rony G. Flatscher

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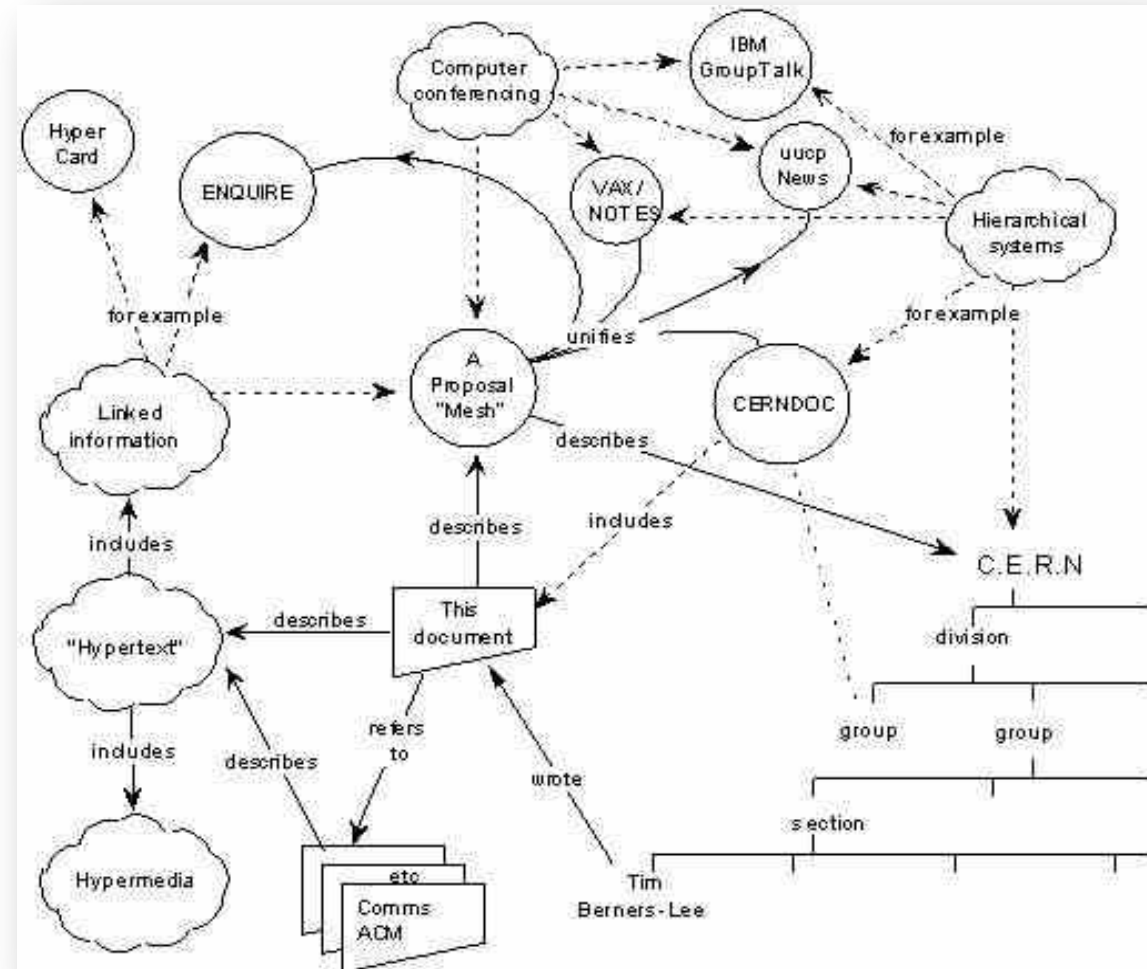
Tim Feldmann (h1552931)

Table of Content

1. History
 - 1.1 Tim Berners-Lee and the Beginning of Web Browsers
 - 1.2 Milestones
 - 1.3 Browser Wars
2. Concepts
 - 2.1 Functionality
 - 2.2 Standards
3. Market
 - 3.1 Overview
 - 3.2 Benchmarking
4. Discussion
5. Bibliography

1. History

1.1 Tim Berners-Lee and the Beginning of Web Browsers



1.2 Milestones



First Web
Browser



“Line-mode Browser”



Mosaic



Internet Explorer

ARPAnet

Netscape Navigator; W3C

Safari

Firefox

Chrome

1968

1990

1991

1993

1994

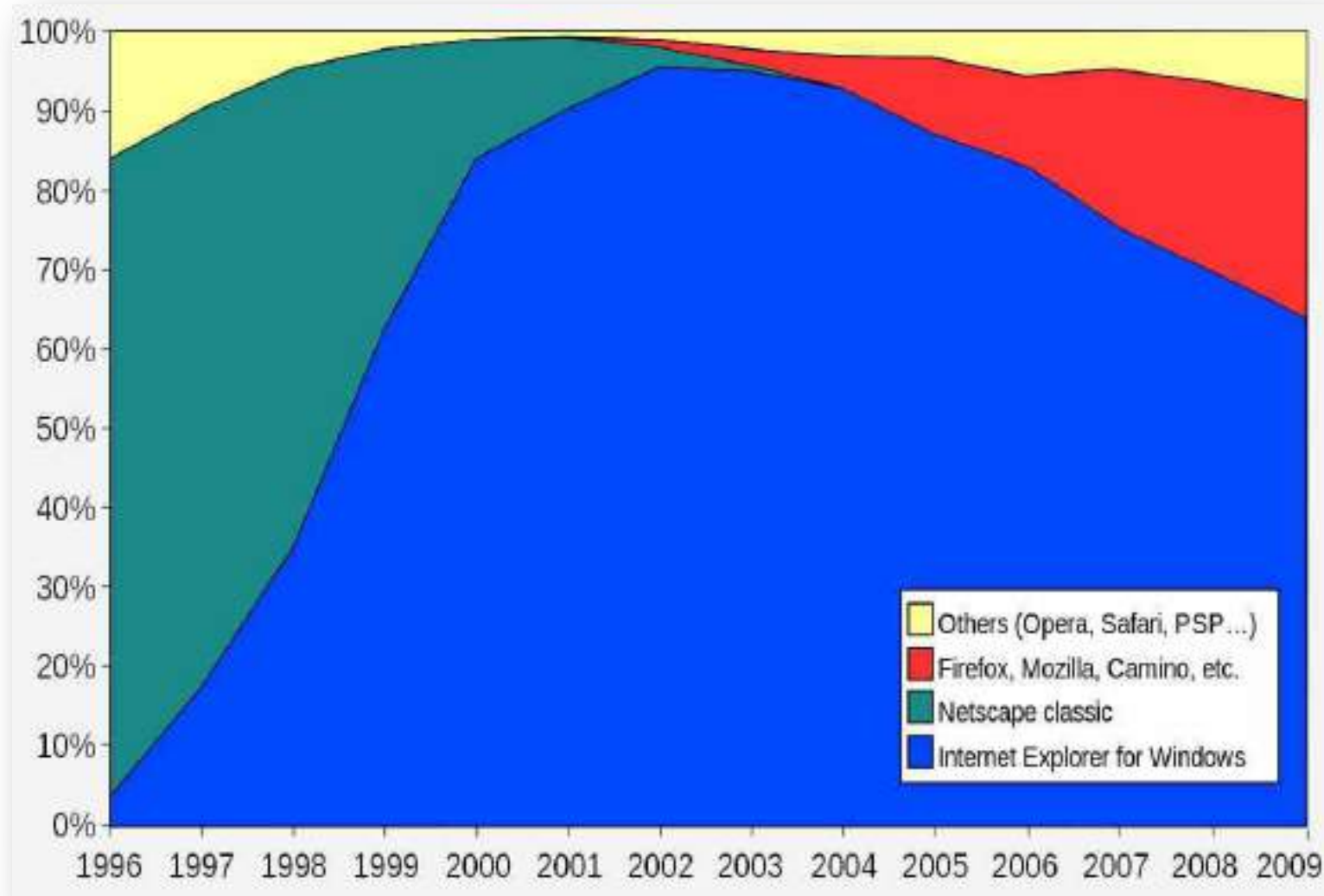
1996

2003

2004

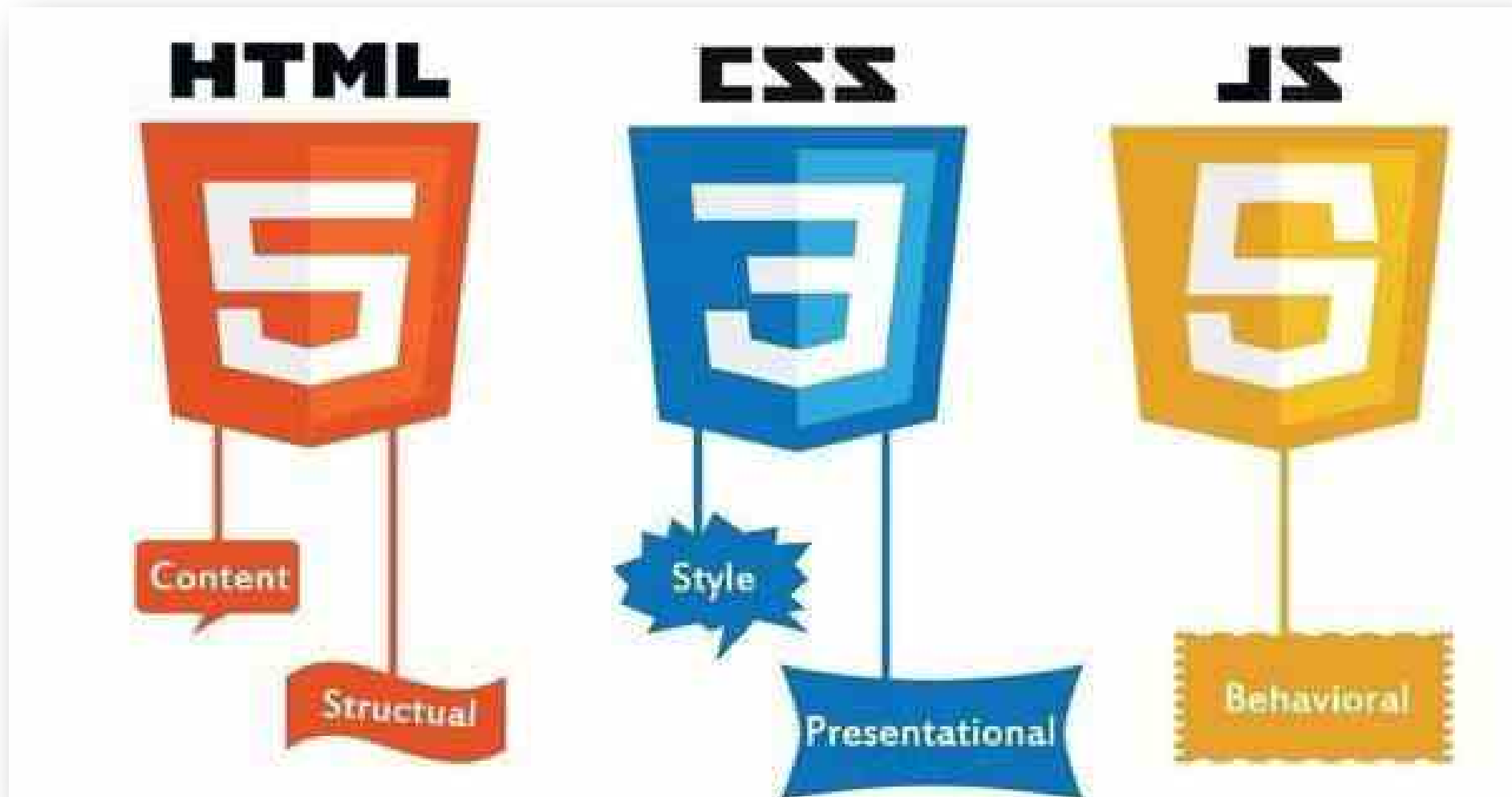
2008

1.3 Browser Wars

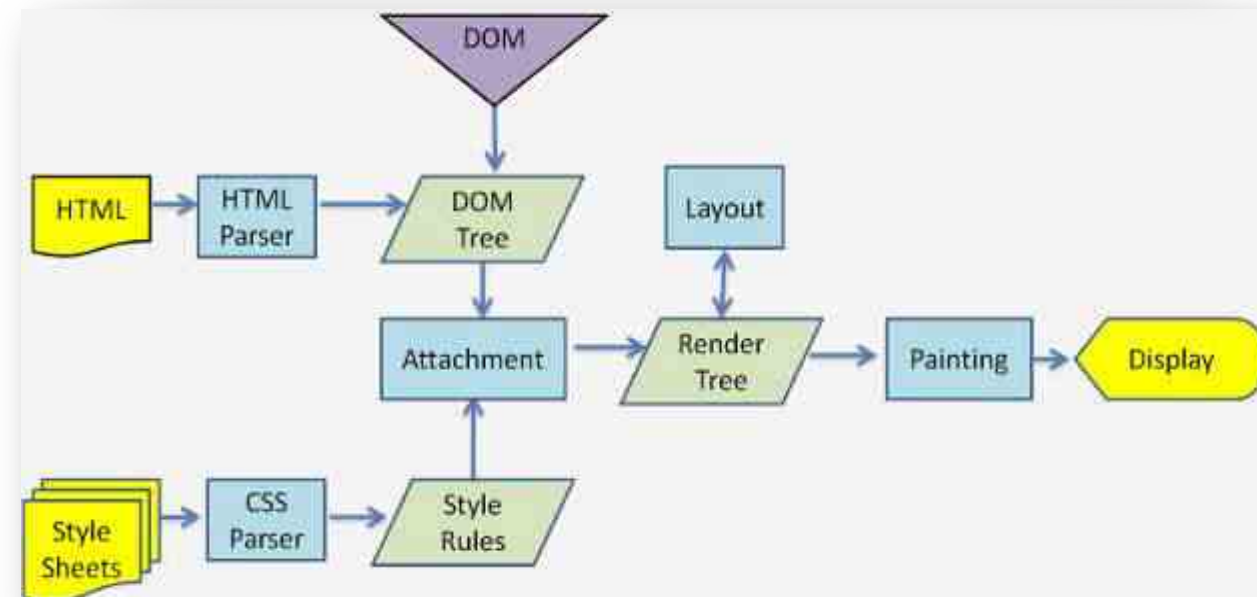
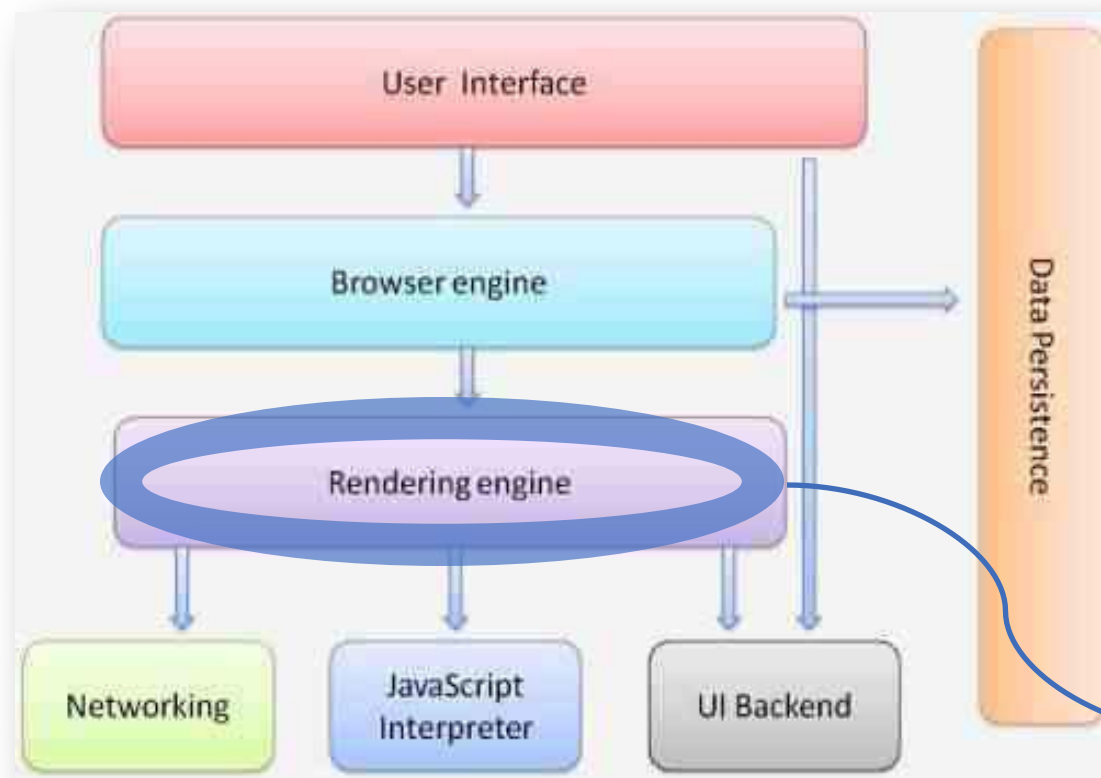


Market Share Web Browsers

2. Concepts



2.1 Functionality



2.2 Standards

Definition:

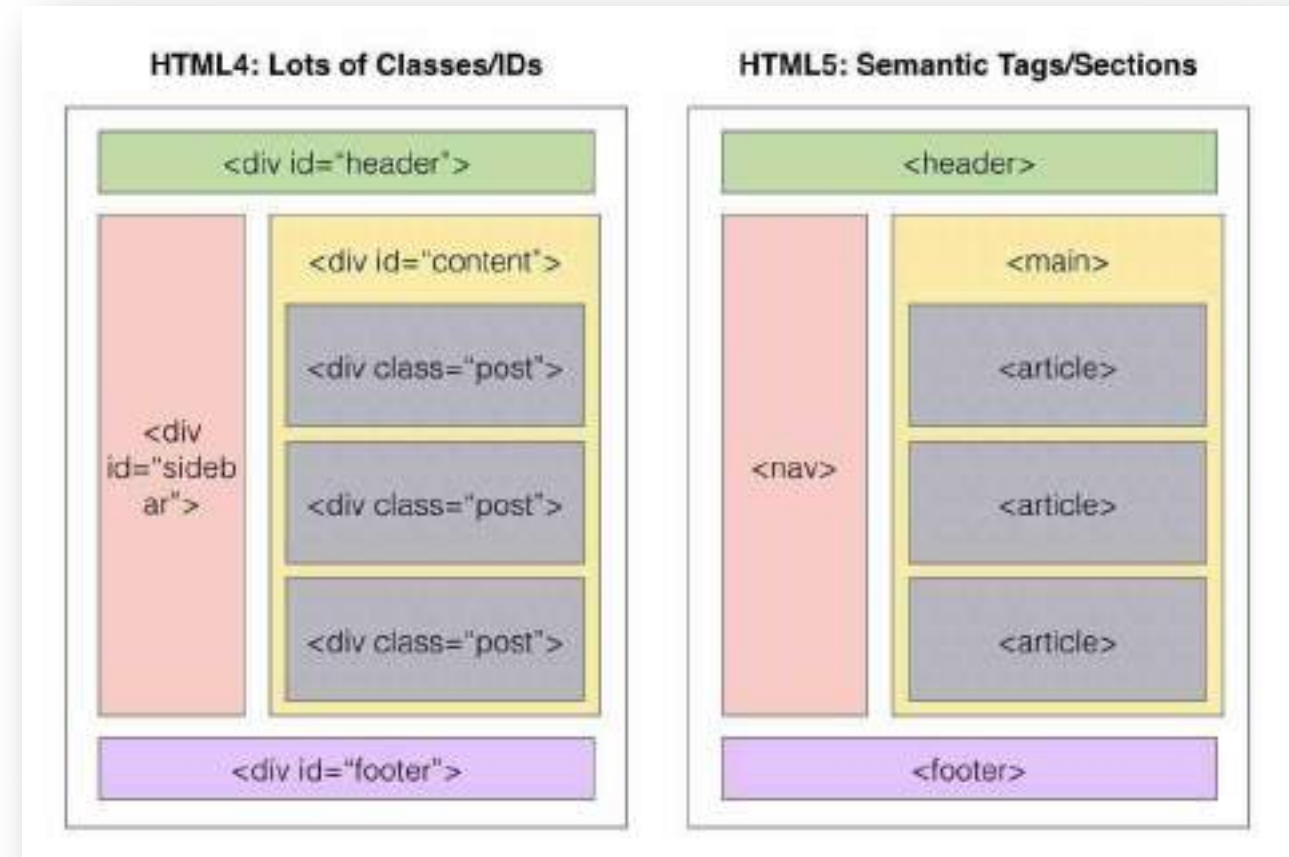
- These Web standards are the technologies we use to build web sites. One of the main ideas of web standards is that the web should be free to contribute and use and should not be constrained by patents and licenses.

Important Organisations:

- W3C (World Wide Web Consortium): develops these technical specifications and guidelines through a process designed to maximize consensus about the content of a technical report
- WHATWG (Web Hypertext Application Technology Working Group): Working group whose aim is to develop new technologies by extending existing technologies to make it easier for authors to create Internet applications

HTML5 Standards

- The HTML5 specification defines the 5th major revision of the core language of the World Wide Web, which is called Hypertext Markup Language and used for structuring and presenting content in the web.
- Released in 2014
- Major Changes: `<section>`, `<nav>`, `<article>`, `<aside>`, `<header>`, `<footer>`, or `<main>`

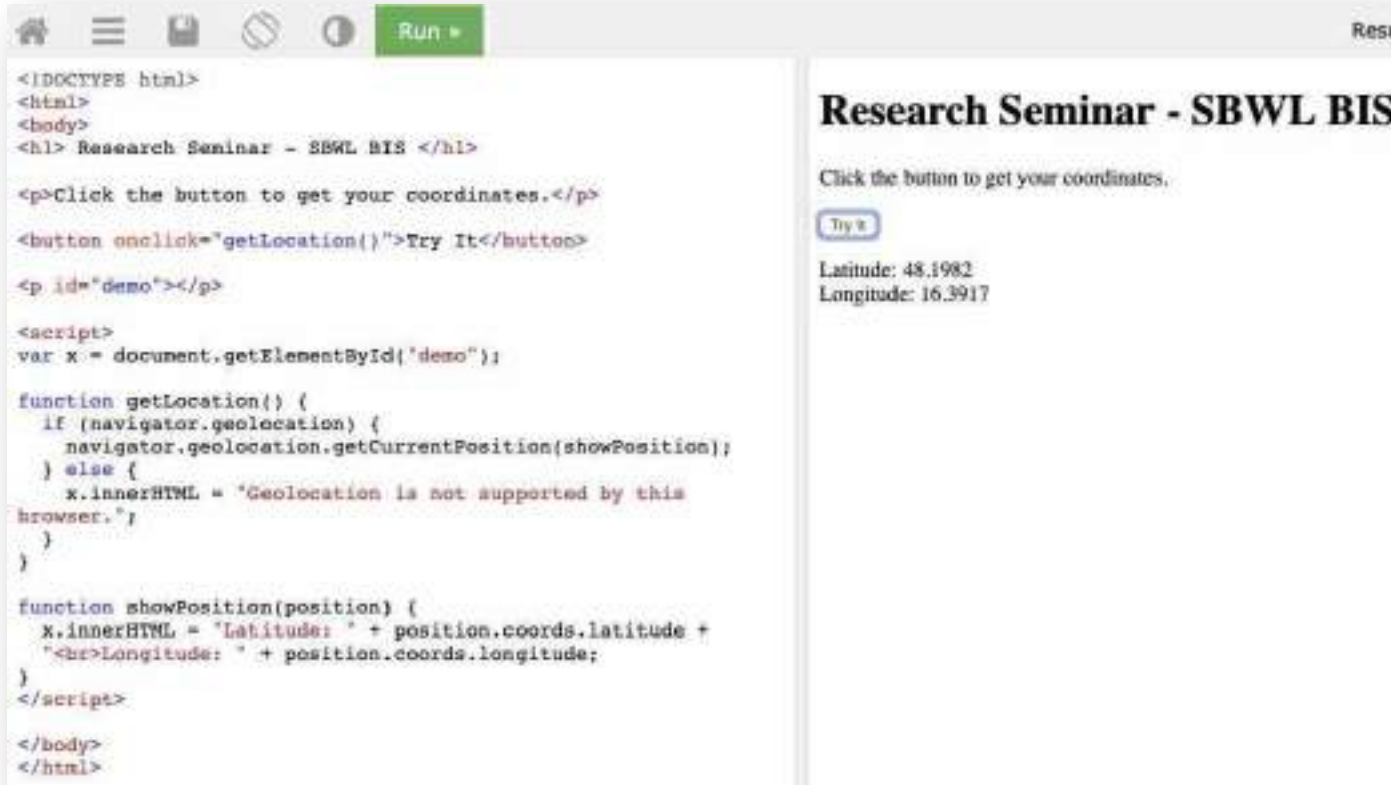


CSS 3 Standards



- Cascading Style Sheets (CSS) is the language for describing the presentation of Web pages, including colors, layout, and fonts.
- CSS is a common living standard and is constantly being developed by the W3C.

JavaScript Standards



```

<!DOCTYPE html>
<html>
<body>
<h1> Research Seminar - SBWL BIS </h1>

<p>Click the button to get your coordinates.</p>
<button onclick="getLocation()">Try It</button>

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

<script>
var x = document.getElementById("demo");

function getLocation() {
  if (navigator.geolocation) {
    navigator.geolocation.getCurrentPosition(showPosition);
  } else {
    x.innerHTML = "Geolocation is not supported by this
browser.";
  }
}

function showPosition(position) {
  x.innerHTML = "Latitude: " + position.coords.latitude +
  "<br>Longitude: " + position.coords.longitude;
}
</script>

</body>
</html>
  
```

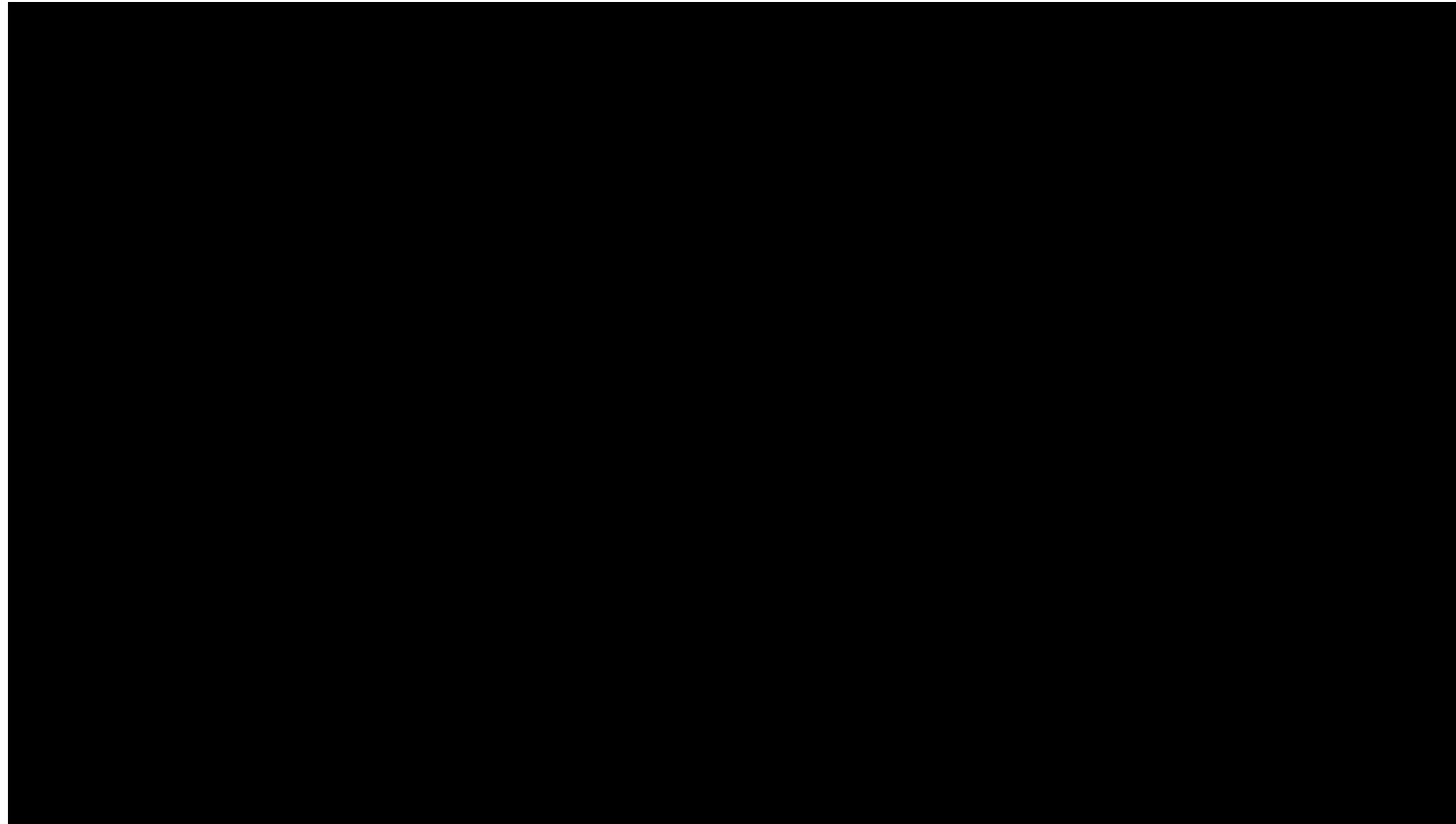
Research Seminar - SBWL BIS
 Click the button to get your coordinates.
 Try It
 Latitude: 48.1982
 Longitude: 16.3917

- JavaScript is a scripting or programming language that allows users to implement complex features on web pages.
- Java Script is used for displaying timely content updates, interactive maps, animated 2D/3D graphics, scrolling video jukeboxes, and more
- APIs (application programming interface): WebRTC, DOM API, Geolocation API

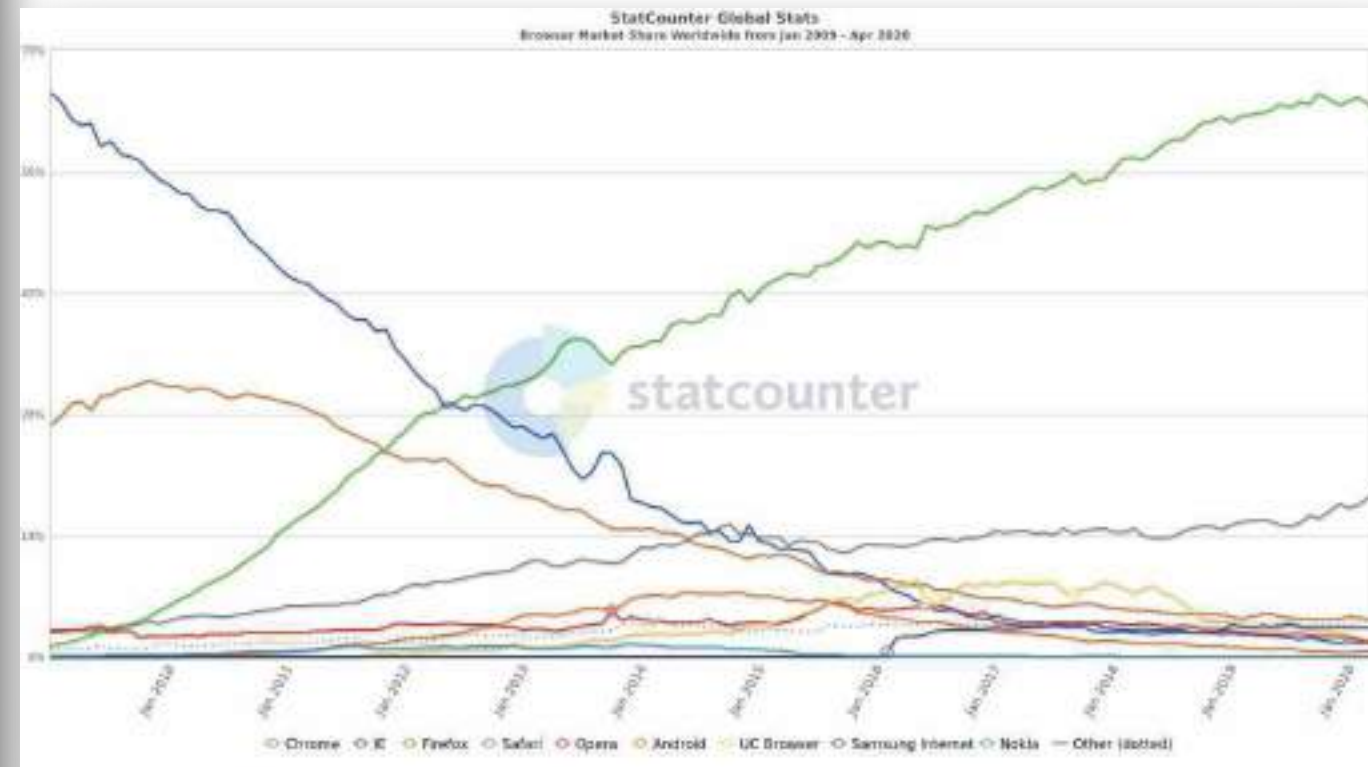
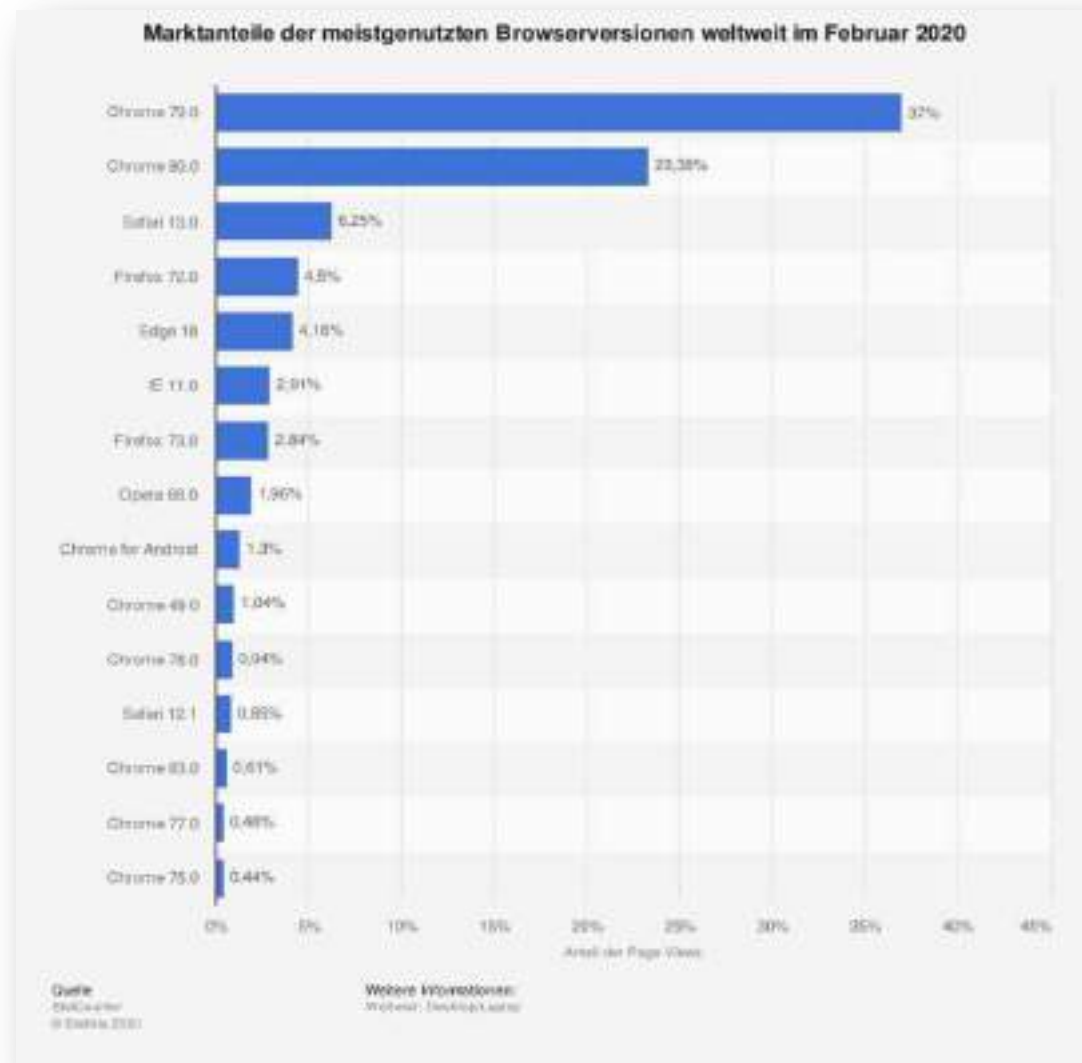
Best Practices

- Cross-browser compatibility
- Responsive web design
- Performance
- Privacy and Security
- Accessibility

3. Market



3.1 Overview

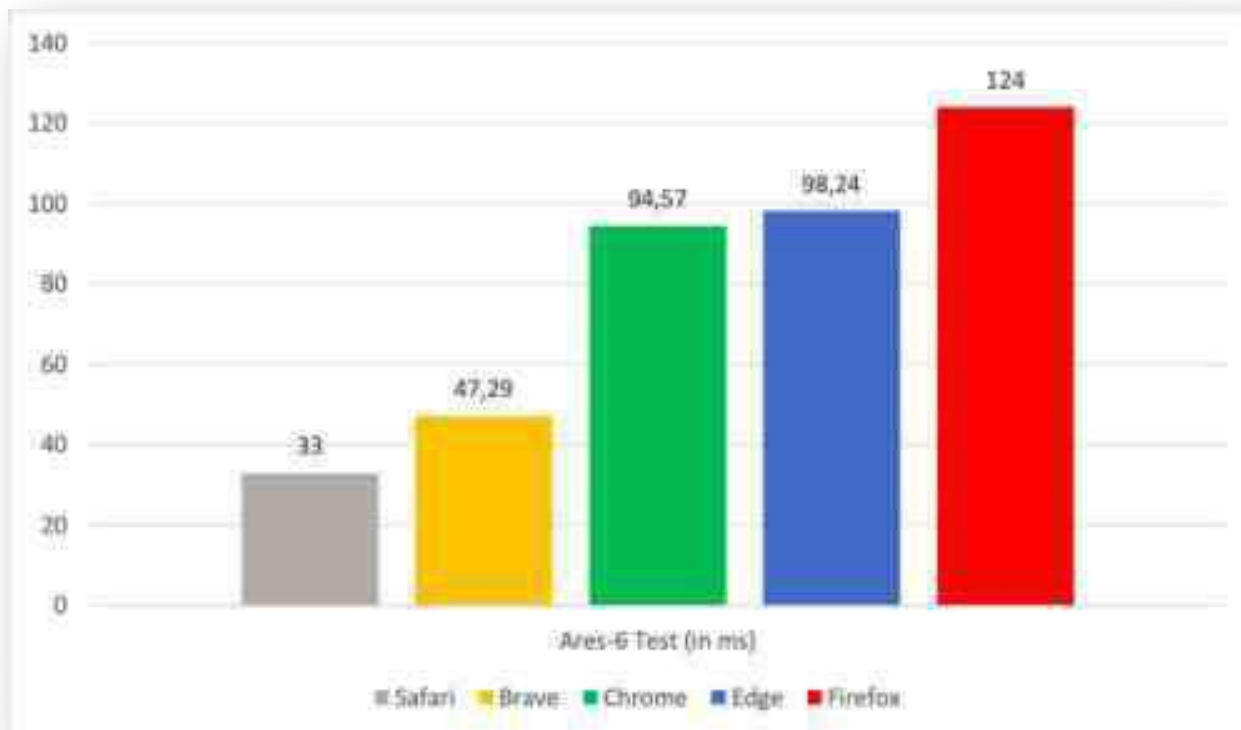


3.2 Benchmarking

- Performed on a MacBook Air (13-inch, Early 2015) with the macOS Catalina operating system
- Tested Browsers (latest Version): Google Chrome, Safari, Mozilla Firefox, Microsoft Edge and Brave.
- For the benchmarks I used the tools HTML5test (<http://html5test.com>), Basemark Web 3.0 (<https://web.basemark.com>), and Ares-6 (<https://browserbench.org/ARES-6/>).

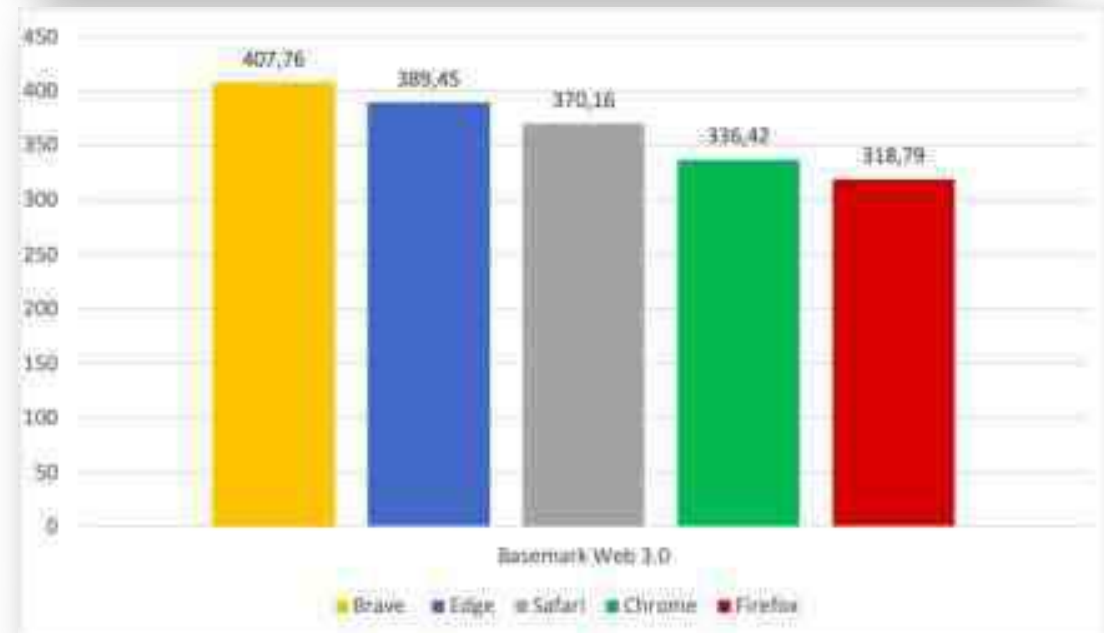
ARES-6

- ARES-6 measures the execution time of JavaScript's newest features.
- Includes four sub-tests: Air, Basic, Babylon, and ML.
- Measured in ms



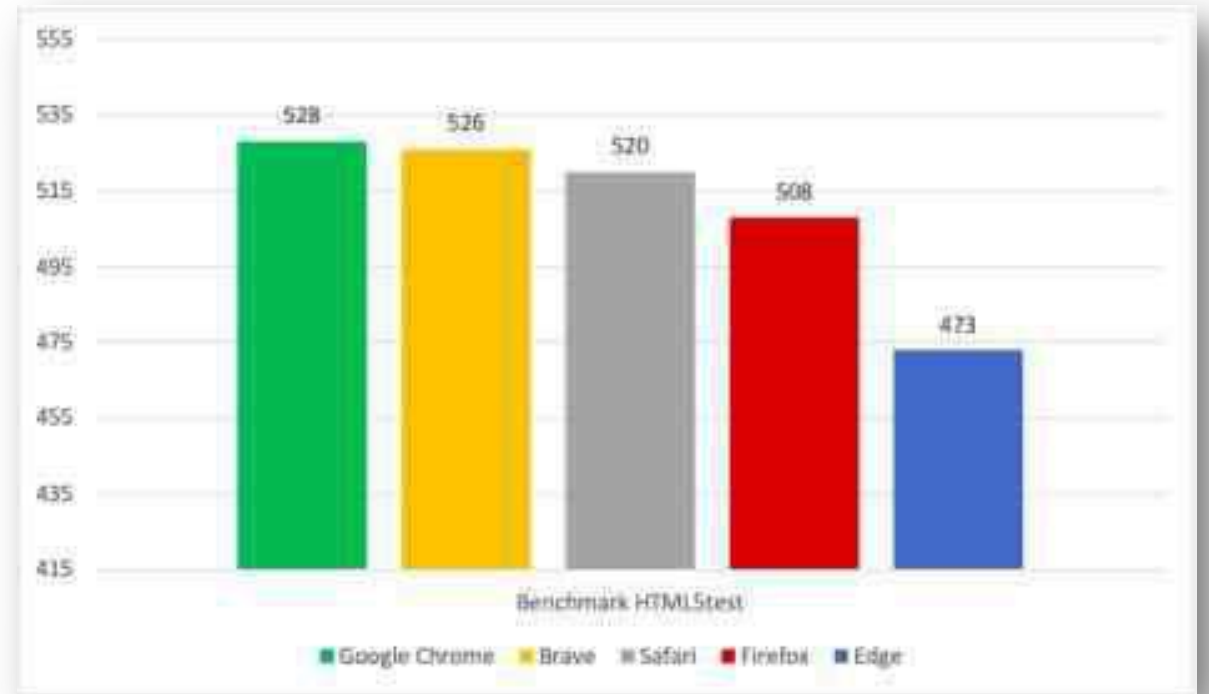
Basemark Web 3.0

- Is based on various system and graphic tests, which use the web recommendations and features.
- Test includes: Low-level JavaScript calculations, graphically intensive content (which mainly uses the GPU of the device)



HTML5test

- Measures how well your browser supports the HTML5 standard and its related specifications.
- Tested categories: parsing rules, elements, forms, web components, location and orientation, security, performance,...
- The maximum score in this test is 555 points.



Conclusion



- The best results overall in my benchmarking test.
- Chromium rendering engine
- Brave can open tabs connected to the Tor network without the need to install the Tor Browser.
- Uses the search engine DuckDuckGo, which does not collect any personal information
- WebRTC: all functions



- Highest market share with over 56% (all Versions=)
- High performance, stability, user-friendliness and innovative design
- Mid-range results in my benchmark tests
- Problems when it comes to tracking protection, as everything is closely linked to the Google Account
- Chromium rendering engine
- WebRTC: all functions



- Ranked in the lower half of tested browsers.
- After losing the Browser war, Edge is a new competitor after changing to Chromium.
- Pre-installed on every Windows device, which can help Microsoft gain new market share
- Privacy weaknesses: third-party cookies are allowed by default



- After the lost browser war, Netscape released the code of its browser and founded the Mozilla Foundation.
- Firefox uses the Gecko rendering engine.
- Recent updates include better privacy protection with anti-tracker support, improved password synchronization between devices, and built-in alerts for security breaches.
- WebRTC: all functions



- Standard browser on every Mac and iOS device.
- Safari has added fingerprint protection that prevents web trackers from identifying users by their system specifications.
- Mid-field in the benchmarking test.

4. Discussion

- Can privacy issues arise in connection with WebRTC?
- What features do you pay attention to when you need to choose a web browser?
- Which functions do you think are essential for a browser? Especially now in the context of the Covid-19 crisis?
- Why do you think the browser benchmarking could have been different on other devices, with other tools?



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