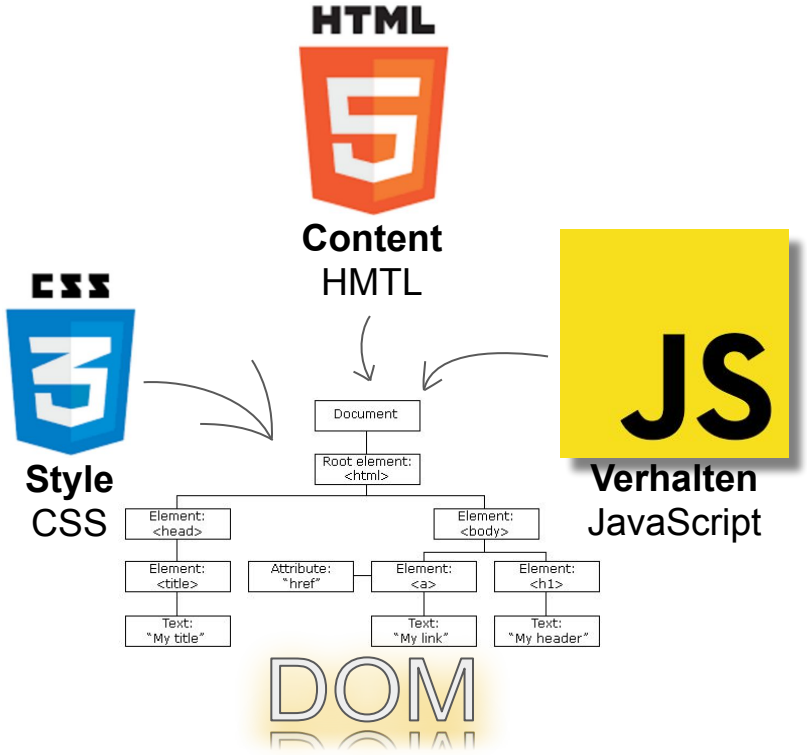
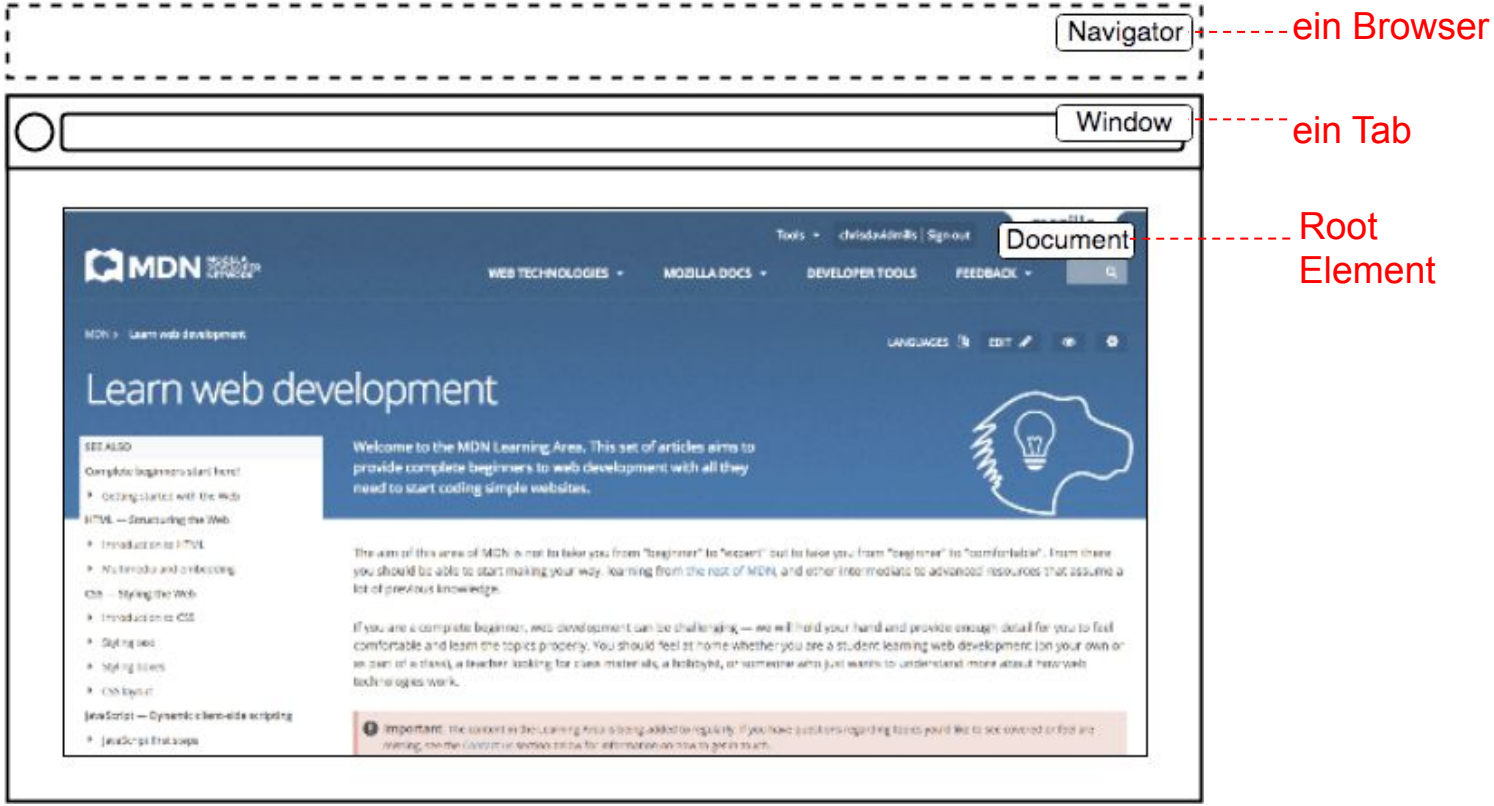
DOM-API



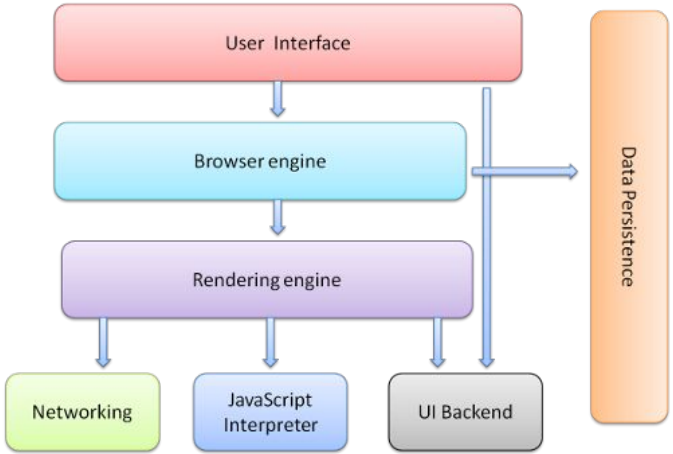
Das Zusammenspiel aller drei Technologien

Grundbegriffe Web APIs

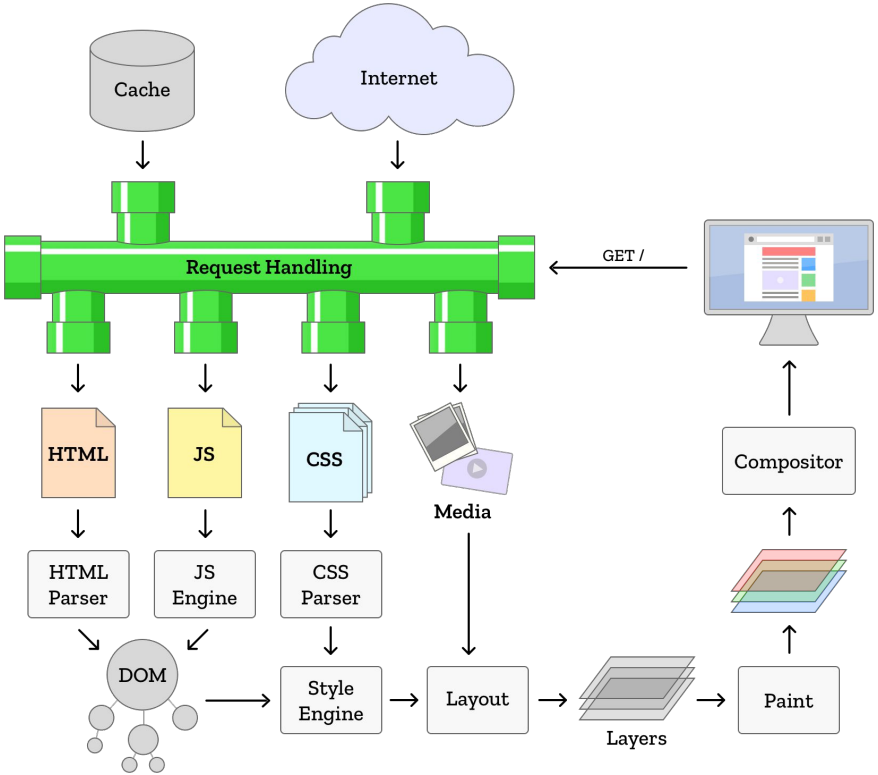


https://developer.mozilla.org/en-US/docs/Learn/JavaScript/Client-side_web_APIs/Manipulating_documents

Gemeinsame Software-Architektur aller Browser

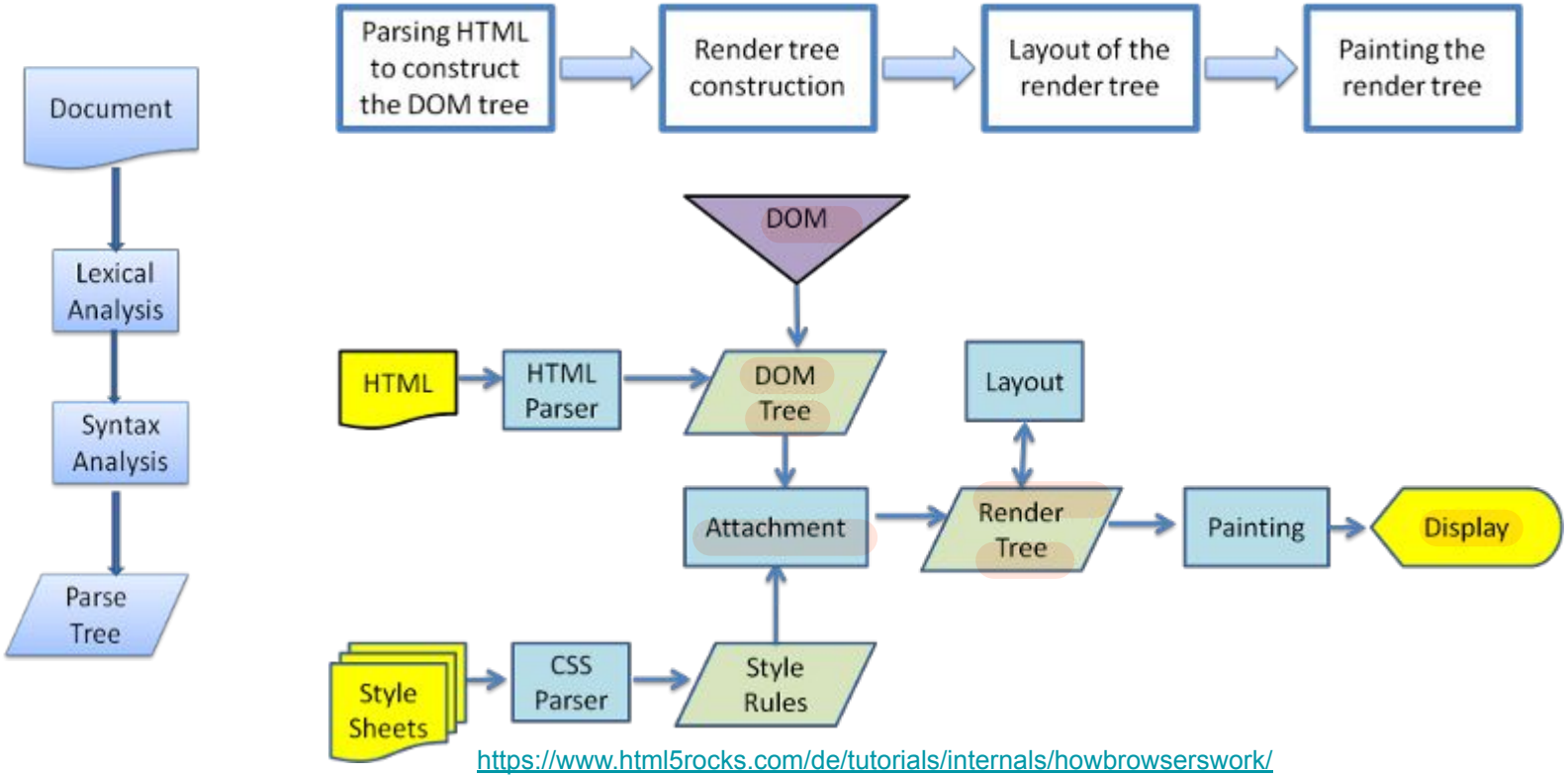


https://www.html5rocks.com/de/tutorials/internals/howbrowserswork/



https://hacks.mozilla.org/2017/05/quantum-up-close-what-is-a-browser-engine/

Grundlegender Ablauf des Renderings



https://www.html5rocks.com/de/tutorials/internals/howbrowserswork/

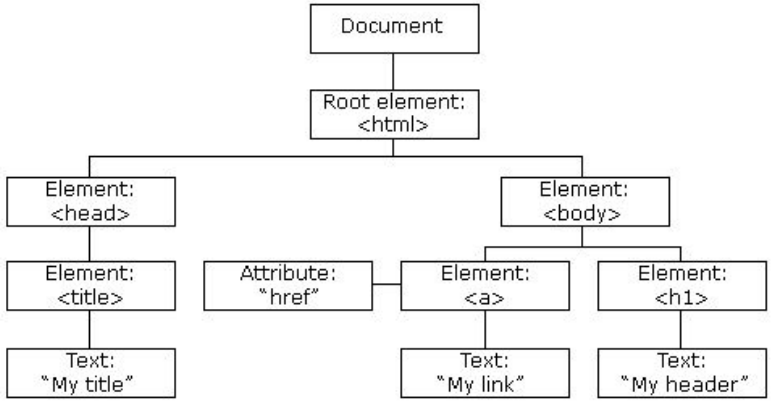
Compilerbau: Parser ⇒ AST

kontextfreie Sprache
(Chomsky-2)

```
<!DOCTYPE html>
<html lang="de">
<head>
    <title>My title</title>
</head>
<body>
   <h1>My header</h1>
   <a href="link.html">My link</a>
</body>
</html>
```

Parser

Abstract Syntax Tree (AST)



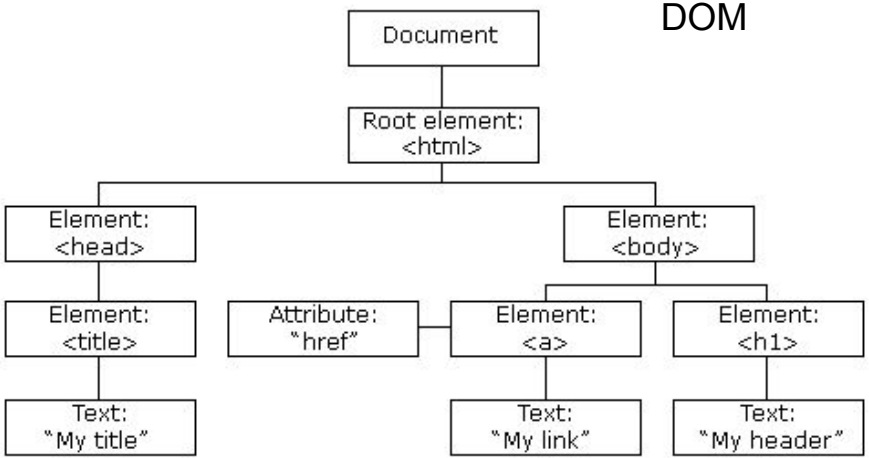
Besonderheit: Der AST ist **standardisiert** für HTML, XML, … und heißt Document Object Model (DOM).

DOM und JavaScript

```
<!DOCTYPE html>
<html lang="de">
<head>
    <title>My title</title>
</head>
<body>
   <h1>My header</h1>
   <a href="link.html">My link</a>
</body>
</html>
```

HTML Parser

DOM




```
<script>

   const header = document.querySelector('h1');
   const link1 = document.querySelector('#link1');

   header.innerText += "... added plain text from JS";
   header.innerHTML += "... with <i>Markup</i>";

   link1.href = "link2.html";
   link1.style.color = 'red';

</script>
```

https://www.w3schools.com/js/js_htmldom.asp

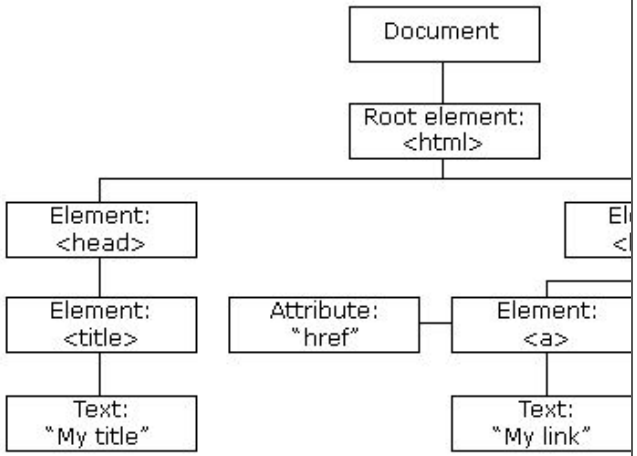
```html
<!DOCTYPE html>
<html lang="de">
<head>
    <title>My title</title>
</head>
<body>
  <h1>My header</h1>
  <a href="link.html">My link</a>
</body>
</html>
```

D

HTM

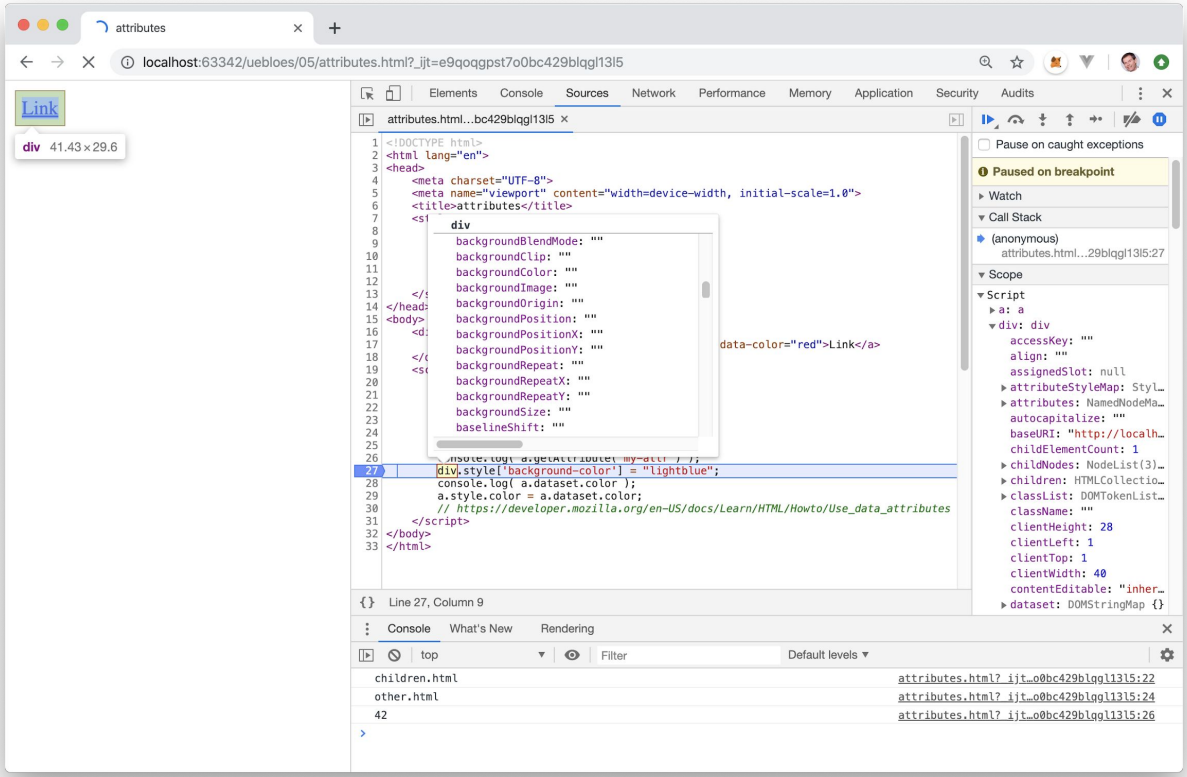
```
<script>
    const header = document.querySelector('h1');
    const link1 = document.querySelector('#link1');
    header.
    hea
    hea
    lin
    lin
</scrip
</body>
</html>
```

```
addEventListener(type: K, listener: (this:Eleme…   void
classList Element (lib.dom.d.ts)                   DOMTokenList
innerHTML Element (lib.dom.d.ts)                   string
scrollIntoView(arg?: boolean | ScrollIntoViewOp…   void
setAttribute(qualifiedName: string, value: stri…   void
className Element (lib.dom.d.ts)                   string
getAttribute(qualifiedName: string)                string | null
setAttributeNS(namespace: string | null, qualif…   void
removeEventListener(type: K, listener: (this:El…   void
getAttributeNames()                                string[]
outerHTML Element (lib.dom.d.ts)                   string
attachShadow(shadowRootInitDict: ShadowRo…         ShadowRoot
assignedSlot Element (lib.dom…                     HTMLSlotElement | null
attributes Element (lib.dom.d.ts)                  NamedNodeMap
clientHeight Element (lib.dom.d.ts)                number
clientLeft Element (lib.dom.d.ts)                  number
clientTop Element (lib.dom.d.ts)                   number
clientWidth Element (lib.dom.d.ts)                 number
Press ^. to choose the selected (or first) suggestion and insert a dot afterwards >>
```



https://www.w3schools.com/js/js_htmldom.asp

Exploring the Element Interface in DevTools



https://developers.google.com/web/tools/chrome-devtools

2 Welten: HTML versus JavaScript-Objekte

HTML Attributes

Object Properties

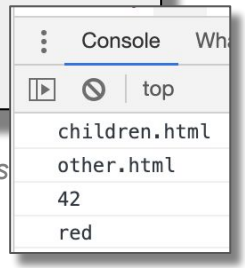
getAttribute('name')

```
<div>
  <a href="children.html" data-color="red">Link</a>
</div>
```

```
<script>
  const div = document.querySelector('div');
  const a = document.querySelector('a');
  console.log( a.getAttribute('href') );
  a.setAttribute( 'href', 'other.html' );
  console.log( a.getAttribute('href') );
  a.setAttribute( 'my-attr', 42 );
  console.log( a.getAttribute('my-attr') );
  div.style['background-color'] = "lightblue";
  console.log( a.dataset.color );
  a.style.color = a.dataset.color;
</script>
```

setAttribute('name')

a.my-attr *// Syntaxfehler, da Minus arithmetische Operation*



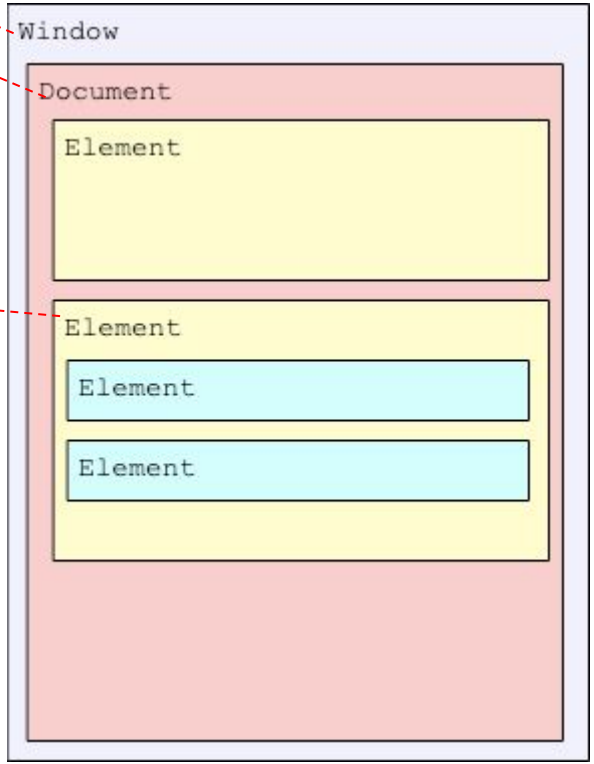
https://developer.mozilla.org/en-US/docs/Learn/HTML/Howto/Use_data_attributes
https://developer.mozilla.org/de/docs/Web/JavaScript/Guide/Mit_Objekten_arbeiten
https://developer.mozilla.org/en-US/docs/Web/API/Element/getAttribute

`window` ist der globale Namensraum
`document` ist das Wurzelelement des DOM

Namensraum pro Tabulator in Browser

Einstieg in DOM über `document`

hierarchisch geschachtelte HTMLElemente



https://developer.mozilla.org/en-US/docs/Web/API/HTML_DOM_API

`Object.keys(window)`

```
["InstallTrigger", "alert", "applicationCache", "atob", "blur", "btoa", "caches",
"cancelAnimationFrame", "captureEvents", "clearInterval", "clearTimeout",
"close", "closed", "confirm", "content", "createImageBitmap", "crypto",
"customElements", "devicePixelRatio", "document", "dump", "external",
"fetch", "find", "focus", "frameElement", "frames", "fullScreen",
"getComputedStyle", "getDefaultComputedStyle", "getSelection", "history",
"indexedDB", "innerHeight", "innerWidth", "isSecureContext", "length",
"localStorage", "location", "locationbar", "matchMedia", "menubar", "moveBy",
"moveTo", "mozInnerScreenX", "mozInnerScreenY", "mozPaintCount", "name",
"navigator", "onabort", "onabsolutedeviceorientation", "onafterprint",
"onanimationend", "onanimationiteration", "onanimationstart", "onauxclick",
"onbeforeprint", "onbeforeunload", "onblur", "oncanplay", "oncanplaythrough",
"onchange", "onclick", "onclose", "oncontextmenu", "ondblclick", "ondevicelight",
"ondevicemotion", "ondeviceorientation", "ondeviceproximity", "ondrag",
"ondragend", "ondragenter", "ondragexit", "ondragleave", "ondragover",
"ondragstart", "ondrop", "ondurationchange", "onemptied", "onended", "onerror",
"onfocus", "onhashchange", "oninput", "oninvalid", "onkeydown", "onkeypress",
"onkeyup", "onlanguagechange", "onload", "onloadeddata", "onloadedmetadata",
"onloadend", "onloadstart", "onmessage", "onmousedown", "onmouseenter",
"onmouseleave", "onmousemove", "onmouseout", "onmouseover", "onmouseup",
"onmozfullscreenchange", "onmozfullscreenerror", "onoffline", "ononline",
"onpagehide", "onpageshow", "onpause", "onplay", "onplaying", "onpopstate",
"onprogress", "onratechange", "onreset", "onresize", "onscroll", "onseeked",
"onseeking", "onselect", "onselectstart", "onshow", "onstalled", "onstorage",
"onsubmit", "onsuspend", "ontimeupdate", "ontoggle", "ontransitioncancel",
"ontransitionend", "ontransitionrun", "ontransitionstart", "onunload",
"onuserproximity", "onvolumechange", "onwaiting", "onwebkitanimationend",
"onwebkitanimationiteration", "onwebkitanimationstart", "onwebkittransitionend",
"onwheel", "open", "opener", "outerHeight", "outerWidth", "pageXOffset",
"pageYOffset", "parent", "performance", "personalbar", "postMessage", "print",
"prompt", "releaseEvents", "requestAnimationFrame", "resizeBy", "resizeTo",
"screen", "screenX", "screenY", "scroll", "scrollBy", "scrollByLines",
"scrollByPages", "scrollMaxX", "scrollMaxY", "scrollTo", "scrollX", "scrollY",
"scrollbars", "self", "sessionStorage", "setInterval", "setResizable",
"setTimeout", "showModalDialog", "sidebar", "sizeToContent", "speechSynthesis",
"status", "statusbar", "stop", "toolbar", "top", "updateCommands", "window"]
```

`window` is the top-level `this`.

`document === window.document`

Vorsicht: automatische Globalisierung !

var, let, const vergessen

```
<script>
  function sum(max){
    for (i = 0; i<max; i++){
      x += i;
    }
    return x;
  }
  x = 1;
  sum(10);
  console.log( x ); // 46
</script>
```

- Nicht-deklarierte Variablen werden automatisch zu Properties des window-Objekts

document

Document

Properties

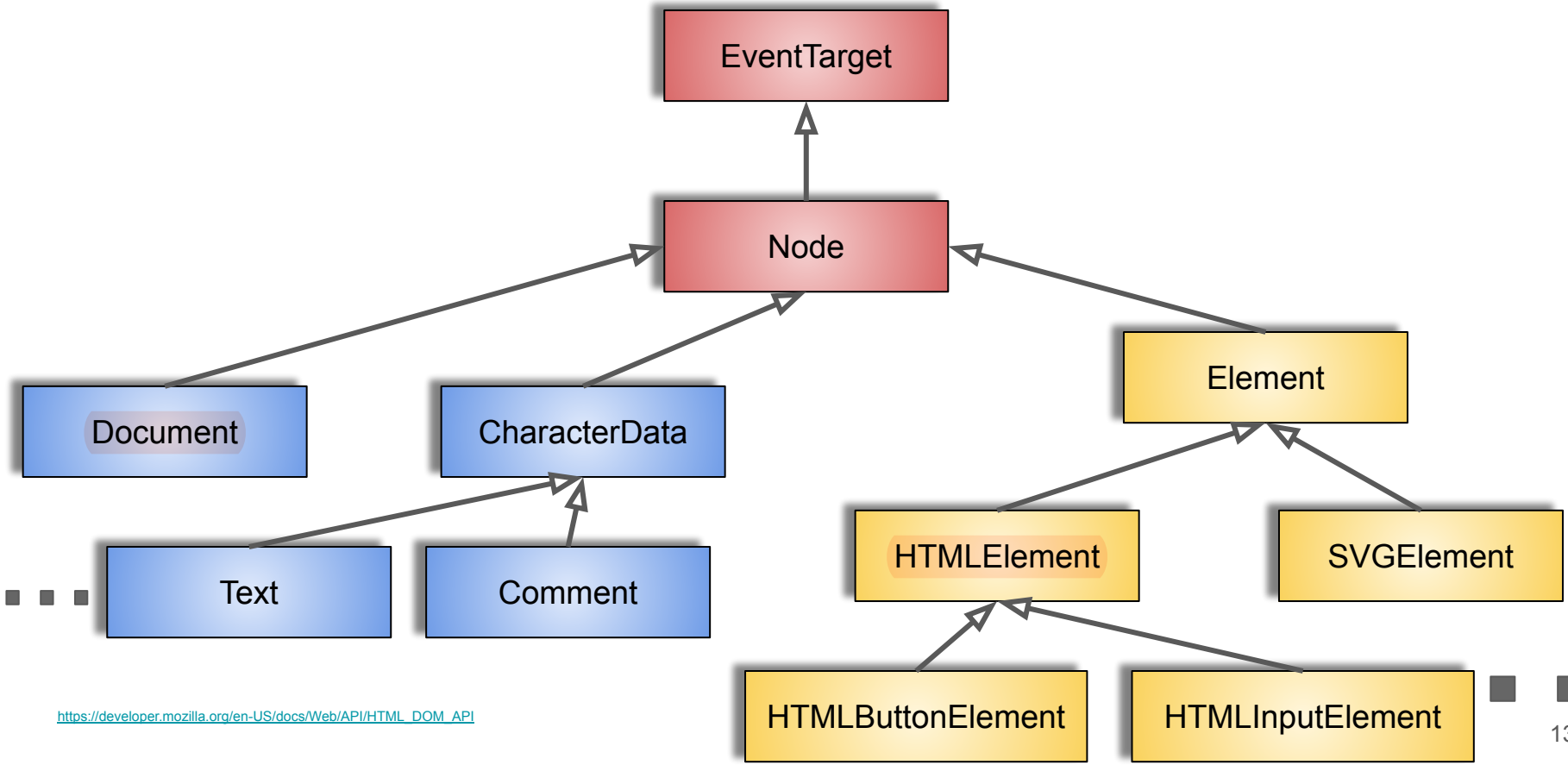
- head
- body
- characterSet
- documentURI
- ■ ■ ■

Methods

- createElement()
- createTextNode()
- getElementsByClassName()
- getElementsByTagName()
- getElementById(String id)
- querySelector()
- querySelectorAll()
- ■ ■ ■

https://developer.mozilla.org/en-US/docs/Web/API/document

DOM-Objekt-Interface-Vererbungshierarchie



https://developer.mozilla.org/en-US/docs/Web/API/HTML_DOM_API

HTML element interfaces

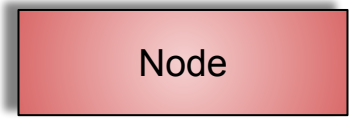
HTML element interfaces

These interfaces represent specific HTML elements (or sets of related elements which have the same properties and methods associated with them).

- HTMLAnchorElement
- HTMLAreaElement
- HTMLAudioElement
- HTMLBRElement
- HTMLBaseElement
- HTMLBaseFontElement
- HTMLBodyElement
- HTMLButtonElement
- HTMLCanvasElement
- HTMLDListElement
- HTMLDataElement
- HTMLDataListElement
- HTMLDetailsElement
- HTMLDialogElement
- HTMLDirectoryElement
- HTMLDivElement
- HTMLElement
- HTMLEmbedElement
- HTMLFieldSetElement
- HTMLFontElement
- HTMLFormElement
- HTMLFrameElement
- HTMLFrameSetElement
- HTMLHRElement
- HTMLHeadElement
- HTMLHeadingElement
- HTMLHtmlElement
- HTMLIFrameElement
- HTMLImageElement
- HTMLInputElement
- HTMLIsIndexElement
- HTMLLIElement
- HTMLLabelElement
- HTMLLegendElement
- HTMLLinkElement
- HTMLMapElement
- HTMLMarqueeElement
- HTMLMediaElement
- HTMLMenuElement
- HTMLMenuItemElement
- HTMLMetaElement
- HTMLMeterElement
- HTMLModElement
- HTMLOListElement
- HTMLObjectElement
- HTMLOptGroupElement
- HTMLOptionElement
- HTMLOutputElement
- HTMLParagraphElement
- HTMLParamElement
- HTMLPictureElement
- HTMLPreElement
- HTMLProgressElement
- HTMLQuoteElement
- HTMLScriptElement
- HTMLSelectElement
- HTMLSlotElement
- HTMLSourceElement
- HTMLSpanElement
- HTMLStyleElement
- HTMLTableCaptionElement
- HTMLTableCellElement
- HTMLTableColElement
- HTMLTableElement
- HTMLTableRowElement
- HTMLTableSectionElement
- HTMLTemplateElement
- HTMLTextAreaElement
- HTMLTimeElement
- HTMLTitleElement
- HTMLTrackElement
- HTMLUListElement
- HTMLUnknownElement
- HTMLVideoElement

https://developer.mozilla.org/en-US/docs/Web/API/HTML_DOM_API

interface Node



Node properties:

- childNodes
- firstChild
- lastChild
- nextSibling
- nodeName
- nodeType
- nodeValue
- parentNode
- previousSibling

■ ■ ■

Node methods:

- appendChild()
- cloneNode()
- contains()
- hasChildNodes()
- insertBefore()
- isEqualNode()
- removeChild()
- replaceChild()

■ ■ ■

interface HTMLElement

HTMLElement properties:

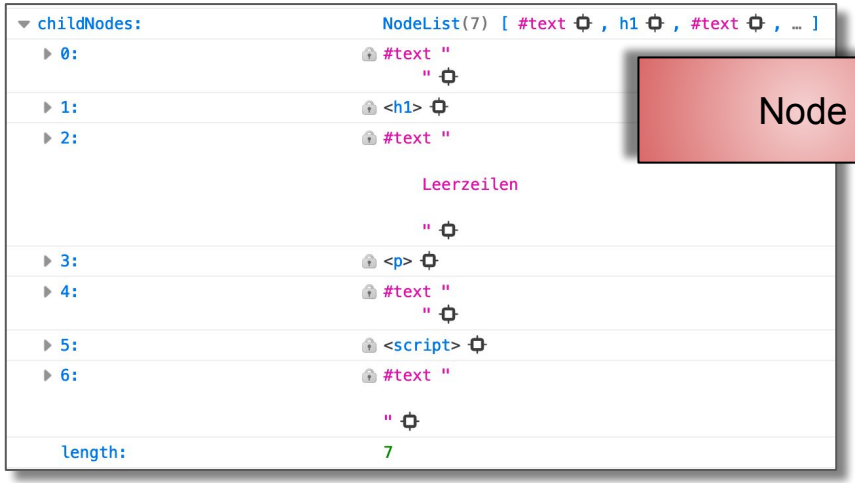
- innerHTML
- outerHTML
- textContent
- innerText
- outerText
- firstElementChild
- lastElementChild
- nextElementChild
- previousElementChild
- children ■ ■ ■

HTMLElement methods:

- blur()
- click()
- focus() ■ ■ ■

Unterschied zwischen Nodes und Elements

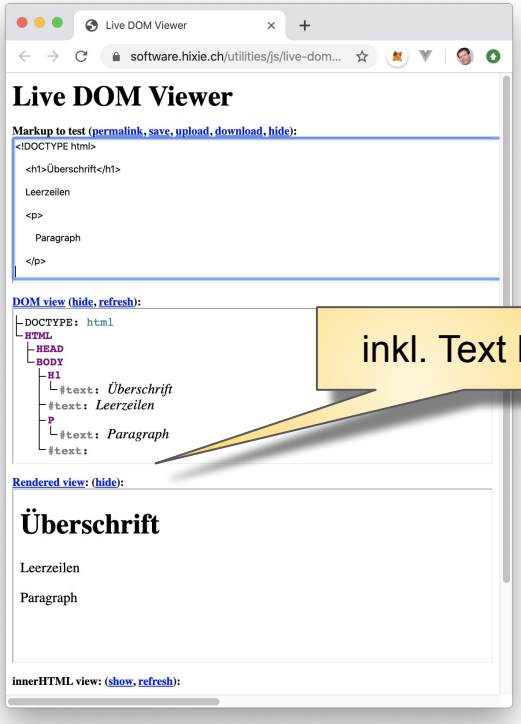
```
<body>
  <h1>Überschrift</h1>

  Leerzeilen

  <p>

    Paragraph

  </p>
  <script>
  </script>
</body>
```



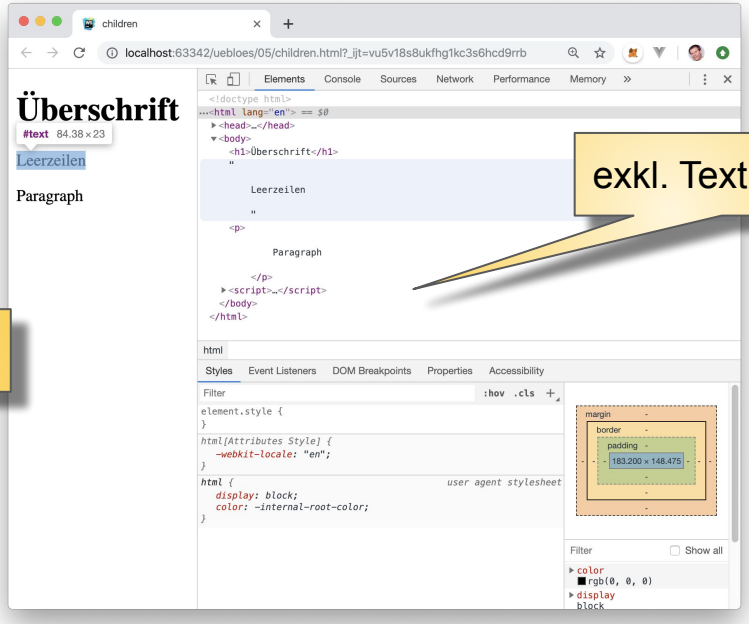
Node

HTMLElement

DOM-Inspektor versus Element-Inspektor



inkl. Text Nodes



exkl. Text Nodes

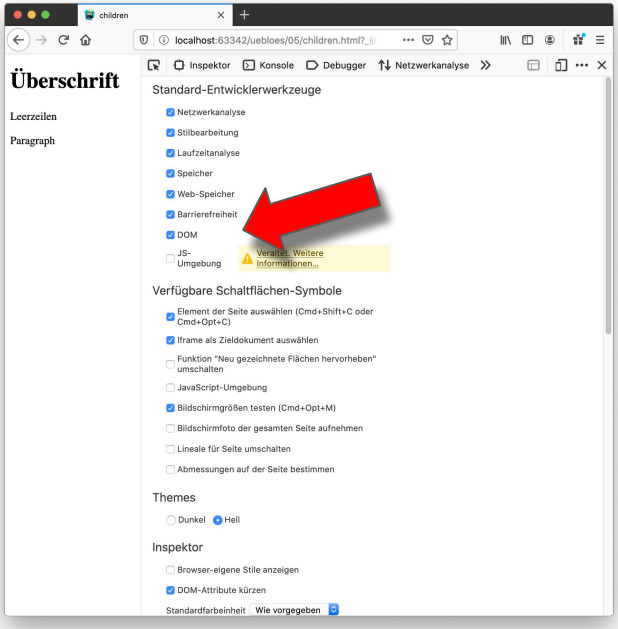
https://software.hixie.ch/utilities/js/live-dom-viewer/

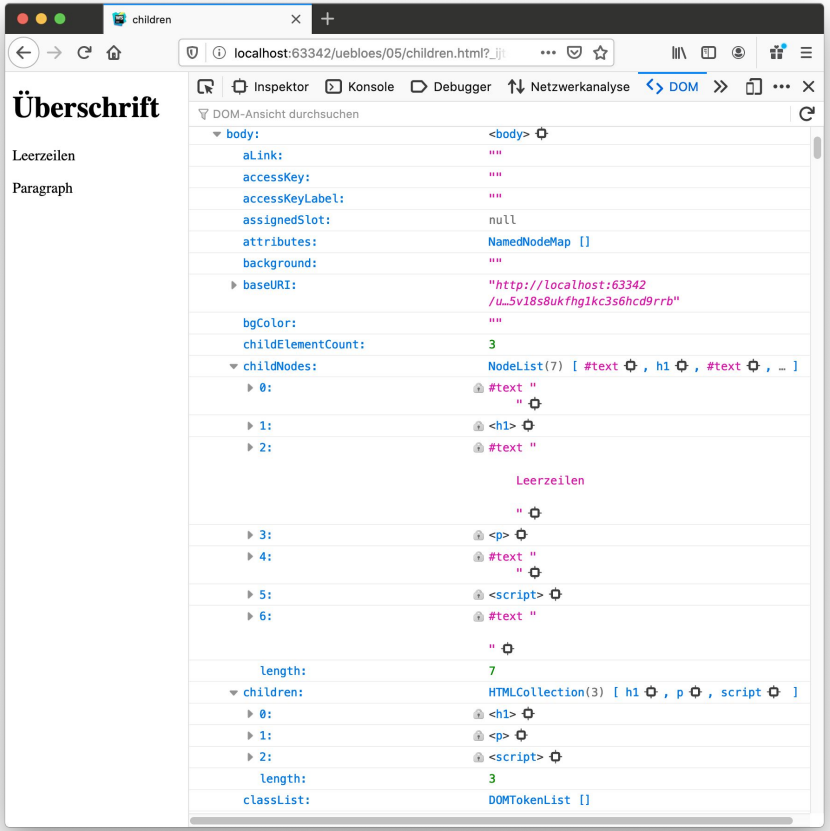
Chrome Elements

- nur Elemente
- keine Text Nodes

Firefox DOM-Inspektor

Einstellungen:





Beispiel HTMLInputElement

MDN web docs moz://a

Technologies ▾ References & Guides ▾ Feedback ▾ Search MDN

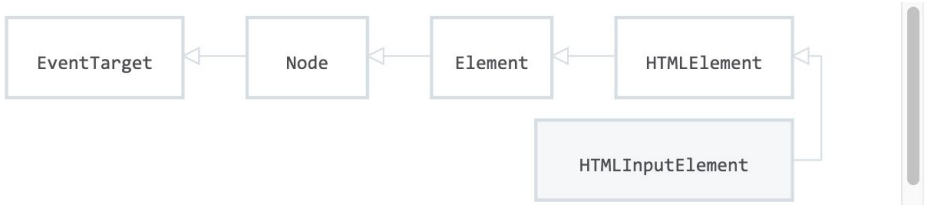
HTMLInputElement

Web technology for developers › Web APIs › HTMLInputElement

On this Page

- Properties
- Methods
- Events
- Specifications
- Browser compatibility
- See also

The `HTMLInputElement` interface provides special properties and methods for manipulating the options, layout, and presentation of `<input>` elements.



https://developer.mozilla.org/en-US/docs/Web/API/HTMLInputElement

Referenz

HTMLElement

Web technology for developers › Web APIs › HTMLElement

Jump to: Properties Methods Events Specifications Browser compatibility See also

The `HTMLElement` interface represents any HTML element. Some elements directly implement this interface, while others implement it via an interface that inherits it.

Properties

Inherits properties from its parent, `Element`, and implements those from `GlobalEventHandlers` and `TouchEventHandlers`.

`HTMLElement.accessKey`

Is a `DOMString` representing the access key assigned to the element.

`HTMLElement.accessKeyLabel` Read only

Returns a `DOMString` containing the element's assigned access key.

`HTMLElement.contentEditable`

Is a `DOMString`, where a value of `"true"` means the element is editable and a value of `"false"` means it isn't.

`HTMLElement.isContentEditable` Read only

Returns a `Boolean` that indicates whether or not the content of the element can be edited.

Methods

Inherits methods from its parent, `Element`.

`HTMLElement.attachInternals()`

Attaches an `ElementInternals` instance to the custom element.

`HTMLElement.blur()`

Removes keyboard focus from the currently focused element.

`HTMLElement.click()`

Sends a mouse click event to the element.

`HTMLElement.focus()`

Makes the element the current keyboard focus.

`HTMLElement.forceSpellCheck()`

Runs the spell checker on the element's contents.

https://developer.mozilla.org/en-US/docs/Web/API/Element

Demo Web-Entwicklung

Introduction to DOM-API

https://www.w3schools.com/js/js_htmldom.asp

JS HTML DOM

DOM Intro
DOM Methods
DOM Document
DOM Elements
DOM HTML
DOM CSS
DOM Animations
DOM Events
DOM Event Listener
DOM Navigation
DOM Nodes
DOM Collections
DOM Node Lists

DOM-API: Erzeugungsmethoden

HTML

```
<!DOCTYPE html>
<html>
<head>
  <title>||Working with elements||</title>
</head>
<body>
  <div id="div1">The text above has been created dynamically.</div>
</body>
</html>
```

JavaScript

```
document.body.onload = addElement;

function addElement () {
  // create a new div element
  // and give it some content
  var newDiv = document.createElement("div");
  var newContent = document.createTextNode("Hi there and greetings!");
  newDiv.appendChild(newContent); //add the text node to the newly created div.

  // add the newly created element and its content into the DOM
  var currentDiv = document.getElementById("div1");
  document.body.insertBefore(newDiv, currentDiv);
}
```

d = document

d.createElement	creates the HTML element
d.createTextNode	Creates a new Text node.
var last_p = d.createElement('p'); d.body.appendChild(last_p);	

https://developer.mozilla.org/en-US/docs/Web/API/Document/createElement

DOM-API: Selektionsmethoden

d = document
e = element

d.getElementById	Returns a reference to the element by its ID
d.getElementsByClassName	Returns an array-like object of all child elements which have all of the given class names.
d.getElementsByTagName	Returns an HTMLCollection of elements with the given tag name.
d.getElementsByName	Returns a nodelist collection with a given name.
e.querySelector	Returns the first Element that matches the specified group of CSS selectors
e.querySelectorAll	Returns a list of the elements that matches the specified group of CSS selectors

Note: The matching is done using **depth-first** pre-order traversal of the document's nodes starting with the first element in the document's markup and iterating through sequential nodes by order of the number of child nodes.

Damit kann man auch **Unterbäume** durchsuchen!

https://developer.mozilla.org/en-US/docs/Web/API/Document/querySelector

Problem: HTMLCollection ist kein JS-Array

Lösung ES6-Spread-Operator … zur Iteration über HTMLCollection

```
2  <html lang="en">
3  <head>
4      <meta charset="UTF-8">
5      <meta name="viewport" content="width=device-width, initial-scale=1.0">
6      <title>Spread</title>
7  </head>
8  <body>
9  <h1>Spread Operator</h1>
10 <ul>
11     <li>1</li>
12     <li>2</li>
13 </ul>
14 <script>
15     document.getElementsByTagName('li').forEach( li => li.innerHTML += ". Fall" );
16 </script>
17 
18 
```

Spread Operator

- 1. Fall
- 2. Fall

```
HTMLCollection(2)
▶ 0: li
▶ 1: li
  length: 2
▶ __proto__: HTMLCollection
```

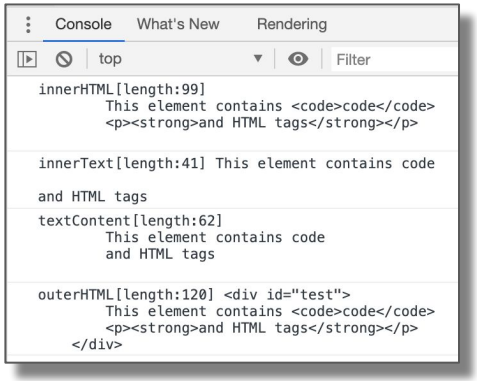
```
▶ Uncaught TypeError:
document.getElementsByTagName(...).forEach is not a function
    at Spread.html?_ijt=1p9…omsgh56bp18i07f4:15
```

```
<!doctype html>
<h1>Spread Operator</h1>
<ul>
  <li>1</li>
  <li>2</li>
</ul>
<script>
  [...document.getElementsByTagName('li')].map(li=>li.innerHTML += ". Fall");
</script>
```

Lesen mit innerHTML, innerText, textContent und outerHTML

- **innerHTML**
  mit inneren HTML-Tags
- **innerText**
  ohne Tags, style-aware
- **textContent**
  ohne Tags, not aware of style
- **outerHTML**
  mit äußeren Tags

```
  <div id="test">
    This element contains <code>code</code>
    <p><strong>and HTML tags</strong></p>
  </div>
<script>
  const x = document.getElementById('test');
  ['innerHTML', 'innerText', 'textContent', 'outerHTML' ].forEach(
        prop => {
    console.log( `${prop}[length:${x[prop].length}] ${x[prop]}` );
  });
</script>
```



https://stackoverflow.com/questions/19030742/difference-between-innertext-and-innerhtml

Schreiben mit innerHTML, innerText, textContent und outerHTML

- **innerHTML**
  ruft HTML-Parser, Layouter, Painter auf
- **innerText**
  nur Text, **Reflow**, style aware
- **textContent**
  nur Text, not aware of style
- **outerHTML**
  überschreibt auch äußere Tags, ruft HTML-Parser, Layouter, Painter auf

```
<div id="test">
   This element contains <code>code</code>
   <p><strong>and HTML tags</strong></p>
</div>
```

```
<script>
  const testDiv = document.getElementById('test');
  const content = `This element contains <code>code</code>
     <p><strong>and HTML tags</strong></p>`;
  testDiv.innerHTML = content;
  // testDiv.innerText = content;
  // testDiv.textContent = content;
  // testDiv.outerHTML = content;
</script>
```

https://stackoverflow.com/questions/19030742/difference-between-innertext-and-innerhtml

testDiv.innerHTML = *content*;

This element contains code

and HTML tags

```
▼<body>
  ▼<div id="test">
      "This element contains "
      <code>code</code>
    ▼<p>
        <strong>and HTML tags</strong>
      </p>
    </div>
```

testDiv.outerHTML = *content*;

This element contains code

and HTML tags

```
▼<body>
    "
        This element contains "
    <code>code</code>
  ▼<p>
      <strong>and HTML tags</strong>
    </p>
```

https://stackoverflow.com/questions/19030742/difference-between-innertext-and-innerhtml

**ohne **

***testDiv*.textContent = *content*;**

This element contains <code>code</code> and HTML tags

```
▼<body>
  ▼<div id="test">
     "This element contains <code>code</code>
             <p><strong>and HTML tags</strong></p>"
   </div>
```

***testDiv*.innerText = *content*;**

This element contains <code>code</code> and HTML tags

```
▼<body>
  ▼<div id="test">
     "This element contains <code>code</code>"
     <br>
     "          <p><strong>and HTML tags</strong></p>"
   </div>
```

**ohne
**

https://stackoverflow.com/questions/19030742/difference-between-innertext-and-innerhtml

Differences textContent versus innerText

Don't get confused by the differences between **`Node.textContent`** and **`HTMLElement.innerText`**. Although the names seem similar, there are important differences:

- **`textContent`** gets the content of all elements, **including `<script>` and `<style>`** elements. In contrast, `innerText` only shows “human-readable” elements.
- `textContent` returns every element in the node. In contrast, **`innerText` is aware of styling** and won’t return the text of “hidden” elements. Moreover, since `innerText` takes CSS styles into account, reading the value of **`innerText` triggers a reflow** to ensure up-to-date computed styles. (Reflows can be computationally expensive, and thus should be avoided when possible.)
- Unlike `textContent`, altering `innerText` in **Internet Explorer** (version 11 and below) removes child nodes from the element and *permanently destroys* all descendant text nodes. It is impossible to insert the nodes again into any other element or into the same element anymore.

https://developer.mozilla.org/en-US/docs/Web/API/Node/textContent

4 Wege, JavaScript in HTML einzubetten

4 Wege der Einbettung:

1. JavaScript direkt hinein schreiben

2. JavaScript-Programm ausführen, um ein anderes JavaScript-Programm aus einer externen Datei zu laden

3. JavaScript aus einer externen Datei laden

4. Inline JavaScript

```
<!doctype html>
<html>
<head>
  <title>My title</title>
  <script> alert('Hallo Welt'); //... JavaScript direkt
    document.write('<script src="http://URL.de"></script>');
  </script>
  <script src="/Pfad/zur/externen_Datei/javascript.js"></script>
</head>
<body>
  <h1>My header</h1>
  <div onclick="alert('Hallo Welt')"> ... </div>
```

JavaScript disabled:

```
<noscript>
  Sorry but you need to have scripting
enabled to use this site.
</noscript>
```

Reihenfolge: Ablaufmodell, wie der Browser eine Webseite abarbeitet

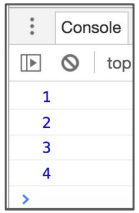
Zeile für Zeile

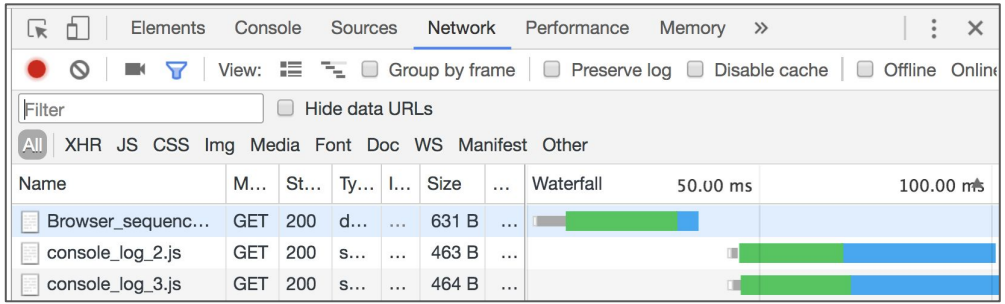
sequentiell

synchron

```
<!doctype html>
<html>
<head>
  <script>console.log( 1 )</script>
  <script src="console_log_2.js"></script>
</head>
<body>
<h1>Browser Ablaufmodell</h1>
<script src="console_log_3.js"></script>
<script>console.log( 4 )</script>
```

Diese Datei wird erst vollständig geladen und ausgeführt, bevor die nächste Zeile angegangen wird.





console_log_2.js

```
console.log(2);
```

<script>-Tag

```
<!doctype html>
<meta charset="utf-8">
<script>
  const myDiv = document.getElementById("myDiv");
  myDiv.innerHTML = "JavaScript wurde jetzt ausgeführt!"
</script>
<div id="myDiv">JavaScript wurde noch nicht ausgeführt!</div>
```

JavaScript wurde noch nicht ausgeführt!

Uncaught TypeError: Cannot set property 'innerHTML' of null

Reihenfolge wichtig: DOM-Elemente müssen vorher existieren:

```
<!doctype html>
<meta charset="utf-8">
<div id="myDiv">JavaScript wurde noch nicht ausgeführt!</div>
<script>
  const myDiv = document.getElementById("myDiv");
  myDiv.innerHTML = "JavaScript wurde jetzt ausgeführt!"
</script>
```

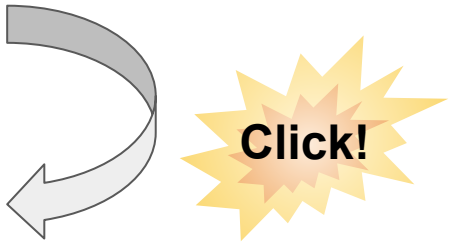
JavaScript wurde jetzt ausgeführt!

<script>-Tag für Event-Handler

```
<!doctype html>
<meta charset="utf-8">
<div onclick="changeText(this)">JavaScript wurde noch nicht ausgeführt!</div>
<script>
 function changeText( element ){
   element.innerHTML = "JavaScript wurde jetzt ausgeführt!";
 }
</script>
```

JavaScript wurde noch nicht ausgeführt!

JavaScript wurde jetzt ausgeführt!



Unobstrusive JavaScript

```
<!DOCTYPE html>
<h1 onclick="this.innerText += 'Ooops!';">Click on this text!</h1>
```

```
<!DOCTYPE html>
<h1 onclick="changeText(this)">Click on this text!</h1>

<script>
 function changeText( elem ) {
   elem.innerText += "Ooops!";
 }
</script>
```

Unobstrusive JavaScript

```
<!DOCTYPE html>
<h1>Click on this text!</h1>

<script>

 const h1 = document.querySelector("h1");
 h1.addEventListener("click", function( event ){
   this.innerText += "Ooops!"
 });

</script>
```

Saubere Trennung von HTML und JavaScript

Timer-API

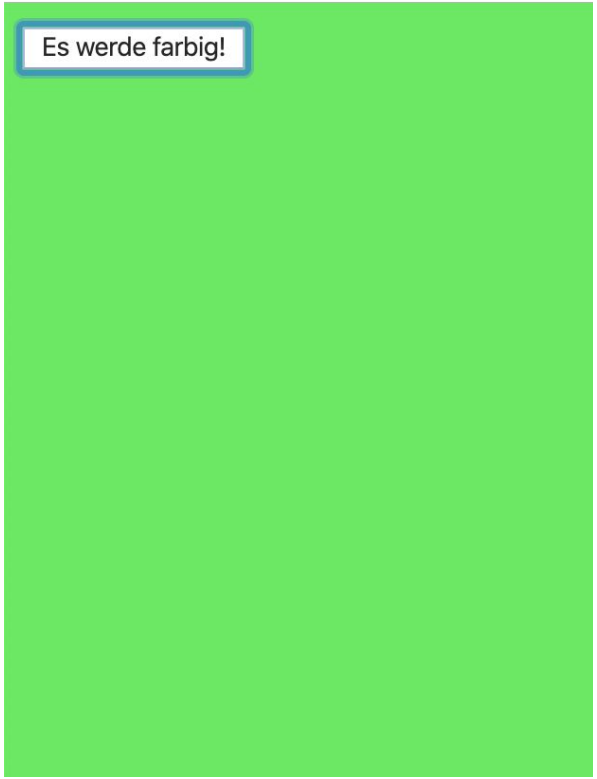
1. `setTimeout(callback [, delay]);`
2. `repeater = setInterval(callback, delay);`
3. `clearInterval( repeater );`

```
<h1></h1>
<script>
  const h1 = document.querySelector('h1');
  const repeater = setInterval( () => h1.innerText = new Date().toLocaleTimeString('de-DE'), 1000);
  setTimeout( () => clearInterval( repeater ), 10_000 );
</script>
```

https://developer.mozilla.org/en-US/docs/Web/API/WindowOrWorkerGlobalScope/setTimeout
https://developer.mozilla.org/en-US/docs/Web/API/WindowOrWorkerGlobalScope/setInterval
https://developer.mozilla.org/en-US/docs/Web/API/WindowOrWorkerGlobalScope/clearInterval

Add or Change CSS rules at runtime

```
<!doctype html>
<body>
<button>Es werde farbig!</button>
<script>
 const button = document.querySelector('button');
 button.onclick =
       event => document.body.style.backgroundColor = getRandomColor();

 function getRandomColor() {
   var letters = '0123456789ABCDEF';
   var color = '#';
   for (var i = 0; i < 6; i++) {
     color += letters[Math.floor(Math.random() * 16)];
   }
   return color;
 }
</script>
</body>
```



Form values ⇒ **value**-Property in HTMLElement

HTML:

```
<input type="text" name="name" id="uniqueID" value="value" />
```

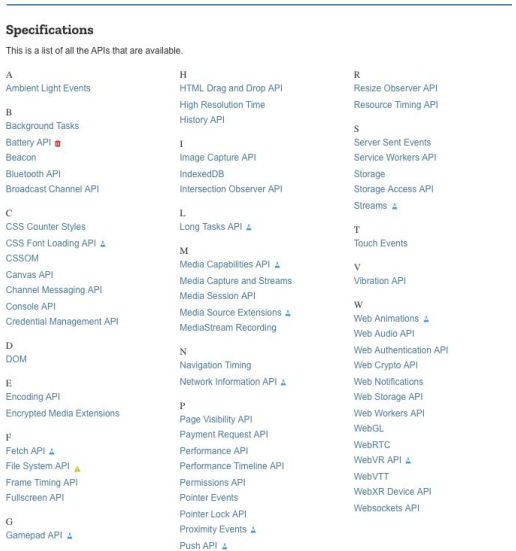
JS:

```
var nameValue = document.getElementById("uniqueID").value;
```

https://stackoverflow.com/questions/3547035/javascript-getting-html-form-values

Web APIs auf dem Stand von 2019

- **API (HTML or XML page) = DOM + JS (scripting language)**
- **66 Specifications**
- **922 Interfaces**



Specifications

This is a list of all the APIs that are available.

A
Ambient Light Events

B
Background Tasks
Battery API
Beacon
Bluetooth API
Broadcast Channel API

C
CSS Counter Styles
CSS Font Loading API
CSSOM
Canvas API
Channel Messaging API
Console API
Credential Management API

D
DOM

E
Encoding API
Encrypted Media Extensions

F
Fetch API
File System API
Frame Timing API
Fullscreen API

G
Gamepad API

H
HTML Drag and Drop API
High Resolution Time
History API

I
Image Capture API
IndexedDB
Intersection Observer API

L
Long Tasks API

M
Media Capabilities API
Media Capture and Streams
Media Session API
Media Source Extensions
MediaStream Recording

N
Navigation Timing
Network Information API

P
Page Visibility API
Payment Request API
Performance API
Performance Timeline API
Permissions API
Pointer Events
Pointer Lock API
Proximity Events
Push API

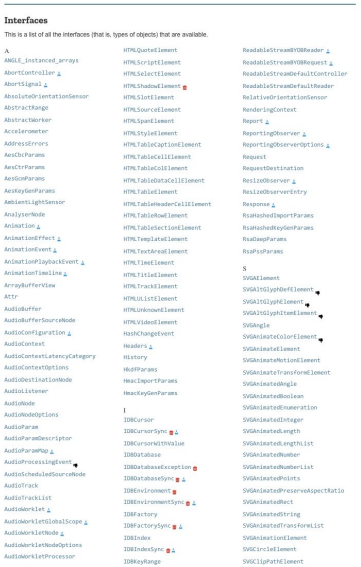
R
Resize Observer API
Resource Timing API

S
Server Sent Events
Service Workers API
Storage
Storage Access API
Streams

T
Touch Events

V
Vibration API

W
Web Animations
Web Audio API
Web Authentication API
Web Crypto API
Web Notifications
Web Storage API
Web Workers API
WebGL
WebRTC
WebVR API
WebVTT
WebXR Device API
Websockets API



Interfaces

This is a list of all the interfaces (that is, types of objects) that are available.

A
ANGLE_instanced_arrays
AbortController
AbortSignal
AbsoluteOrientationSensor
AbstractRange
AbstractWorker
Accelerometer
AddressErrors
AesCbcParams
AesCtrParams
AesGcmParams
AesKeyGenParams
AmbientLightSensor
AnalyserNode
Animation
AnimationEffect
AnimationEvent
AnimationPlaybackEvent
AnimationTimeline
ArrayBufferView
Attr
AudioBuffer
AudioBufferSourceNode
AudioConfiguration
AudioContext
AudioContextLatencyCategory
AudioContextOptions
AudioDestinationNode
AudioListener
AudioNode
AudioNodeOptions
AudioParam
AudioParamDescriptor
AudioParamMap
AudioProcessingEvent
AudioScheduledSourceNode
AudioTrack
AudioTrackList
AudioWorklet
AudioWorkletGlobalScope
AudioWorkletNode
AudioWorkletNodeOptions
AudioWorkletProcessor

HTMLQuoteElement
HTMLScriptElement
HTMLSelectElement
HTMLShadowElement
HTMLSlotElement
HTMLSourceElement
HTMLSpanElement
HTMLStyleElement
HTMLTableCaptionElement
HTMLTableCellElement
HTMLTableColElement
HTMLTableDataCellElement
HTMLTableElement
HTMLTableHeaderCellElement
HTMLTableRowElement
HTMLTableSectionElement
HTMLTemplateElement
HTMLTextAreaElement
HTMLTimeElement
HTMLTitleElement
HTMLTrackElement
HTMLUListElement
HTMLUnknownElement
HTMLVideoElement
HashChangeEvent
Headers
History
HkdfParams
HmacImportParams
HmacKeyGenParams

I
IDBCursor
IDBCursorSync
IDBCursorWithValue
IDBDatabase
IDBDatabaseException
IDBDatabaseSync
IDBEnvironment
IDBEnvironmentSync
IDBFactory
IDBFactorySync
IDBIndex
IDBIndexSync
IDBKeyRange

ReadableStreamBYOBReader
ReadableStreamBYOBRequest
ReadableStreamDefaultController
ReadableStreamDefaultReader
RelativeOrientationSensor
RenderingContext
Report
ReportingObserver
ReportingObserverOptions
Request
RequestDestination
ResizeObserver
ResizeObserverEntry
Response
RsaHashedImportParams
RsaHashedKeyGenParams
RsaOaepParams
RsaPssParams

S
SVGAElement
SVGAltGlyphDefElement
SVGAltGlyphElement
SVGAltGlyphItemElement
SVGAngle
SVGAnimateColorElement
SVGAnimateElement
SVGAnimateMotionElement
SVGAnimateTransformElement
SVGAnimatedAngle
SVGAnimatedBoolean
SVGAnimatedEnumeration
SVGAnimatedInteger
SVGAnimatedLength
SVGAnimatedLengthList
SVGAnimatedNumber
SVGAnimatedNumberList
SVGAnimatedPoints
SVGAnimatedPreserveAspectRatio
SVGAnimatedRect
SVGAnimatedString
SVGAnimatedTransformList
SVGAnimationElement
SVGCircleElement
SVGClipPathElement

ChildNode
Client
Clients
Clipboard
ClipboardEvent
CloseEvent
Comment
CompositionEvent
ConstantSourceNode
ConstrainBoolean
ConstrainDOMString
ConstrainDouble
ConstrainLong
ConvolverNode
Coordinates
CountQueuingStrategy
CrashReportBody
Credential
CredentialsContainer
Crypto
CryptoKey
CryptoKeyPair
CustomElementRegistry
CustomEvent

D
DOMConfiguration
DOMError
DOMException
DOMHighResTimeStamp
DOMImplementation
DOMImplementationList
DOMLocator
DOMMatrix
DOMMatrixReadOnly
DOMObject
DOMParser
DOMPoint
DOMPointInit
DOMPointReadOnly
DOMQuad
DOMRect
DOMRectReadOnly
DOMString
DOMStringList

MediaQueryListListener
MediaRecorder
MediaRecorderErrorEvent
MediaSession
MediaSettingsRange
MediaSource
MediaStream
MediaStreamAudioDestinationNode
MediaStreamAudioSourceNode
MediaStreamAudioSourceOptions
MediaStreamConstraints
MediaStreamEvent
MediaStreamTrack
MediaStreamTrackAudioSourceNode
MediaStreamTrackAudioSourceOptions
MediaStreamTrackEvent
MediaTrackConstraints
MediaTrackSettings
MediaTrackSupportedConstraints
MerchantValidationEvent
MessageChannel
MessageEvent
MessagePort
Metadata
MimeType
MimeTypeArray
MouseEvent
MouseScrollEvent
MouseWheelEvent
MutationEvent
MutationObserver
MutationObserverInit
MutationRecord

N
NameList
NamedNodeMap
NavigationPreloadManager
Navigator
NavigatorConcurrentHardware
NavigatorGeolocation
NavigatorID
NavigatorLanguage
NavigatorOnLine
NavigatorPlugins

SVGSetElement
SVGSolidcolorElement
SVGStopElement
SVGStringList
SVGStylable
SVGStyleElement
SVGSwitchElement
SVGSymbolElement
SVGTRefElement
SVGTSpanElement
SVGTests
SVGTextContentElement
SVGTextElement
SVGTextPathElement
SVGTextPositioningElement
SVGTitleElement
SVGTransform
SVGTransformList
SVGTransformable
SVGURIReference
SVGUnitTypes
SVGUseElement
SVGVKernElement
SVGViewElement
SVGZoomAndPan
Screen
ScreenOrientation
ScriptProcessorNode
ScrollToOptions
SecurityPolicyViolationEvent
Selection
Sensor
SensorErrorEvent
ServiceWorker
ServiceWorkerContainer
ServiceWorkerGlobalScope
ServiceWorkerMessageEvent
ServiceWorkerRegistration
ServiceWorkerState
ShadowRoot
SharedWorker
SharedWorkerGlobalScope
Slotable
SourceBuffer

https://developer.mozilla.org/en-US/docs/Web/API

HTML DOM API interfaces ⊂ Web APIs

1. HTML Element interfaces
2. Web app and browser integration interfaces
3. Form support interfaces
4. Canvas and image interfaces
5. Media interfaces
6. Drag and drop interfaces
7. Page history interfaces
8. Web Components interfaces
9. Miscellaneous and supporting interfaces
10. Interfaces belonging to other APIs
    a. Web storage interfaces
    b. Web Workers interfaces
    c. WebSocket interfaces
    d. Server-sent events interfaces

https://developer.mozilla.org/en-US/docs/Web/API/HTML_DOM_API