



Design and Implementation of Online Behavioral Experiments

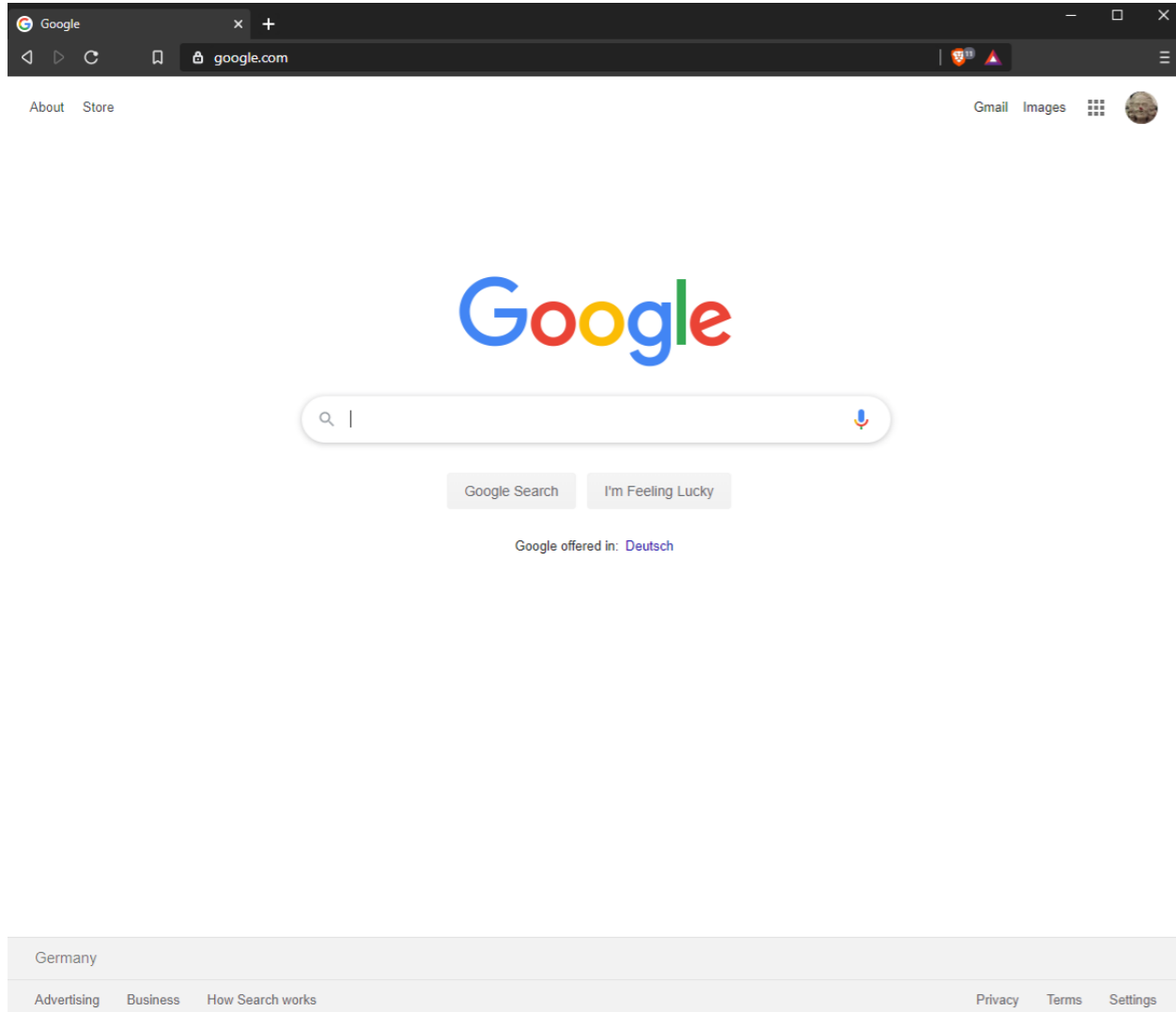


nodeGame.org
Stefano Balietti
MZES and Heidelberg

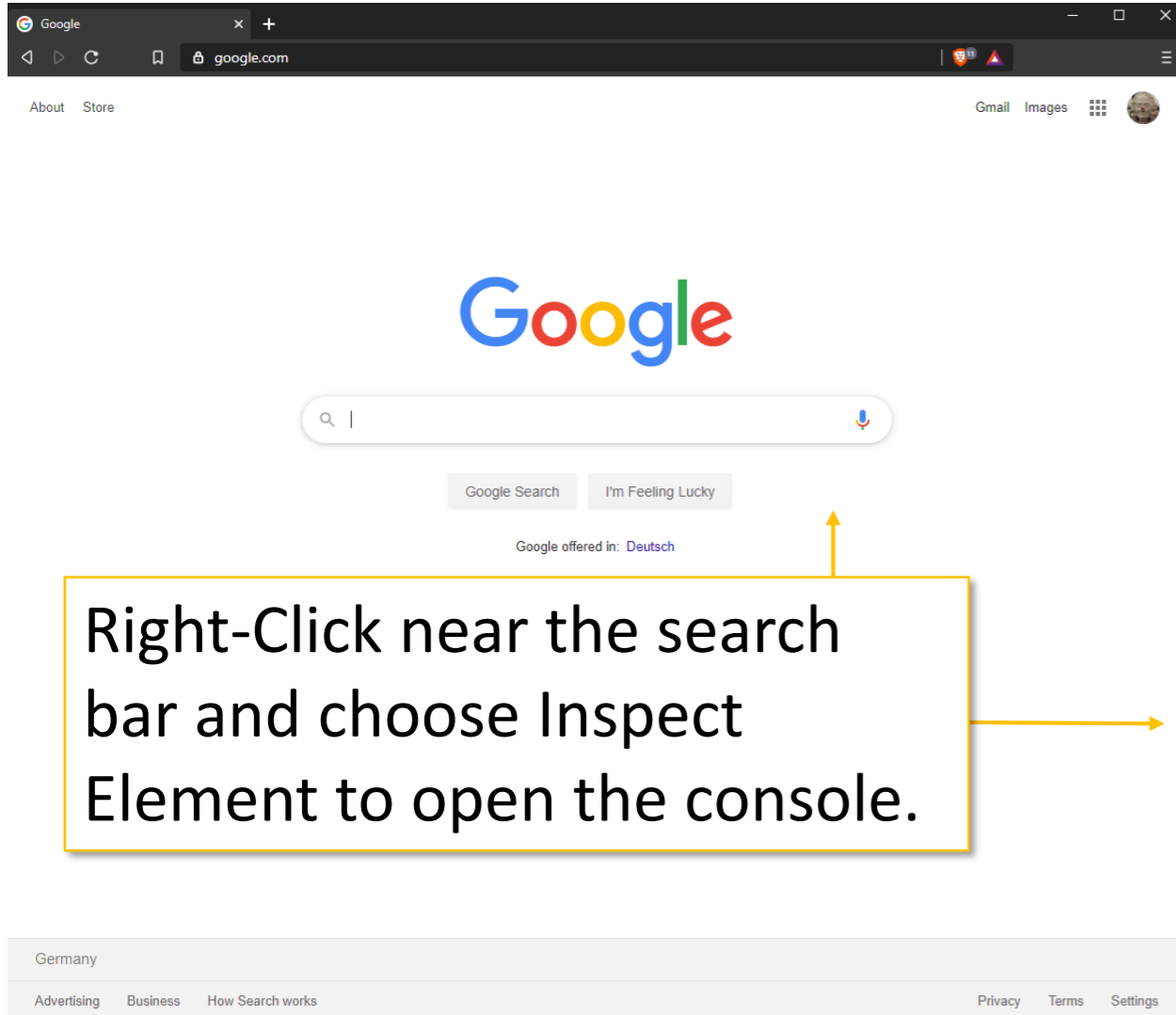
**More
JavaScript**

@balietti
@nodegameorg
stefanobalietti.com@gmail.com

HTML, CSS, JavaScript



HTML, CSS, JavaScript

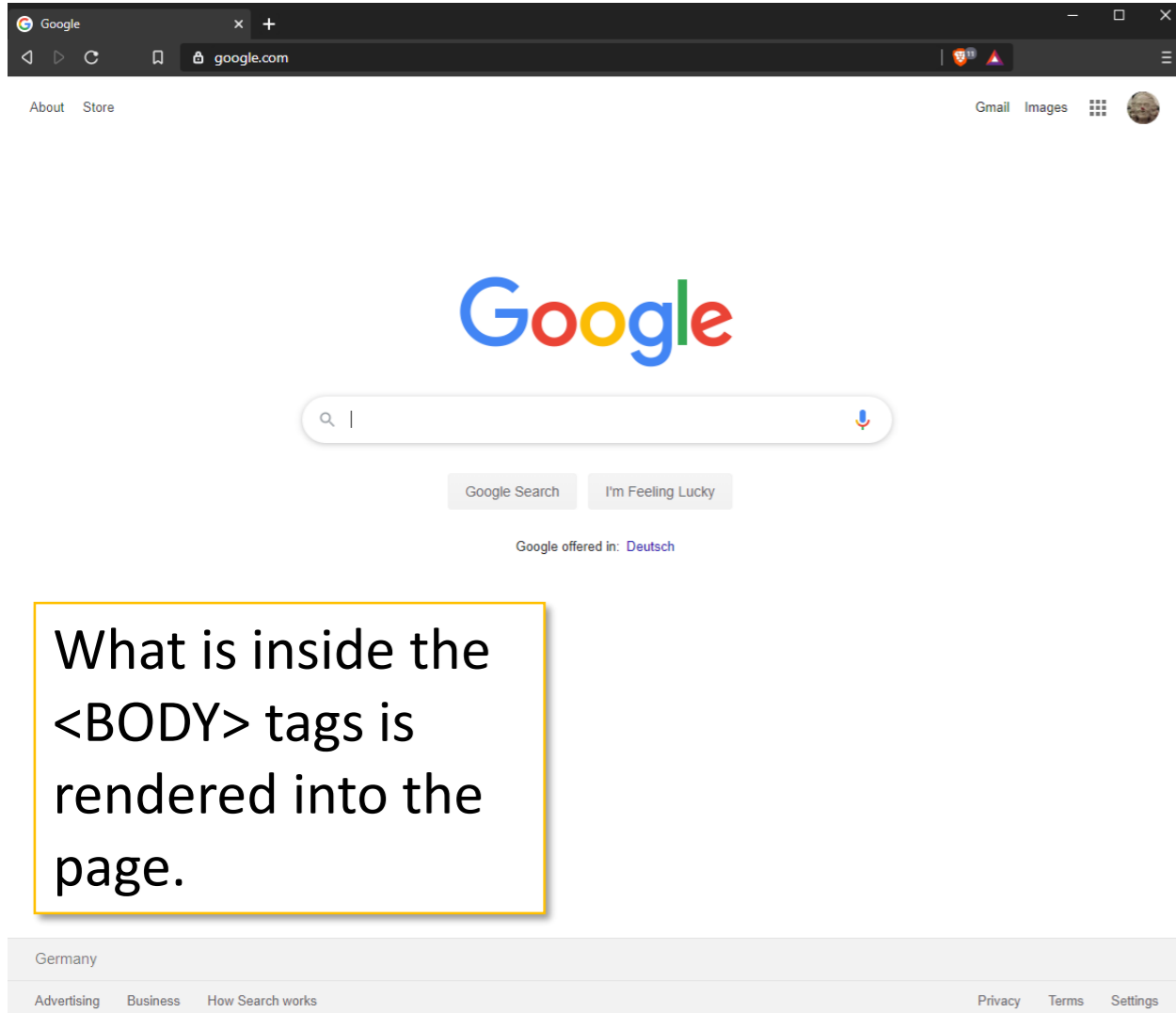


```
..<!doctype html> == $0
<html itemscope itemtype="http://schema.org/WebPage" lang="en-DE">
  <head>...</head>
  <body jsmodel="" class="hp vasq big" id="gsr">
    <style>...</style>
    <style data-jiis="cc" id="gstyle">...</style>
    <style>...</style>
    <div class="ctr-p" id="viewport">
      <div id="doc-info">...</div>
      <div id="cst">...</div>
      <style>...</style>
      <div id="gb" class="gb_Sf">...</div>
      <div class="jhp big" id="searchform">...</div>
      <dialog class="spch-dlg" id="spch-dlg">...</dialog>
      <div jscontroller="fEVMic" style="display:none" data-u="0" jsdata="C4mkuf;;BgdNvo" jsaction="rcuQ6b:npT2md">...</div>
      <div jscontroller="WgDvvc" jsdata="hE2vdf;;BgdNvs" jsaction="rcuQ6b:npT2md">...</div>
    <div class="content" id="main">
      <span class="ctr-p" id="body">
        <center>
          <div id="lga">...</div>
          <div style="height:118px">...</div>
          <div id="prm-pt" style="margin-top:12px">...</div>
        </center>
      </span>
      <div class="ctr-p" id="footer">...</div>
      <div id="footc">...</div>
      <div id="lb">...</div>
    </div>
    <script nonce="26x2AHsATpEG8PX+0mgVtA==">...</script>
    <div class="gb_xa">...</div>
    <style>...</style>
    <script nonce="26x2AHsATpEG8PX+0mgVtA==">...</script>
  </div>
  <textarea class="csi" name="csi" style="display:none">...</textarea>
  <script nonce="26x2AHsATpEG8PX+0mgVtA==">...</script>
  <script src="/xjs/_/js/k=xjs.s.en_GB.N-EDq1FHW8Q.0/ck=xjs.s.W0cJ0W6yTZw.L.W.0/m=Fk...NChbE6QAQ/d=1/dg=2/br=1/ct=zgms/rs=ACT90oGATnID2W4-
Cd5Wk5mwi4CeFK6yfw">...</script>
  <script src="/xjs/_/js/k=xjs.s.en_GB.N-EDq1FHW8Q.0/ck=xjs.s.W0cJ0W6yTZw.L.W.0/am=A_
bd,async,dvl,fEVMic,foot,lu,m,mUpTid,mu,sb_wiz,sf,sonic,spch,xz7cCd?xjs=s1" async gapi_processed="true">...</script>
  <iframe src="https://clients5.google.com/pagead/drt/dn/" aria-hidden="true" style="display: none;">...</iframe>
</body>
</html>
```

HTML, CSS, JavaScript

DOM Tree

```
<HTML>
  <HEAD>
    <LINK>
    <SCRIPT>
  </HEAD>
  <BODY>
    ...
  </BODY>
</HTML>
```

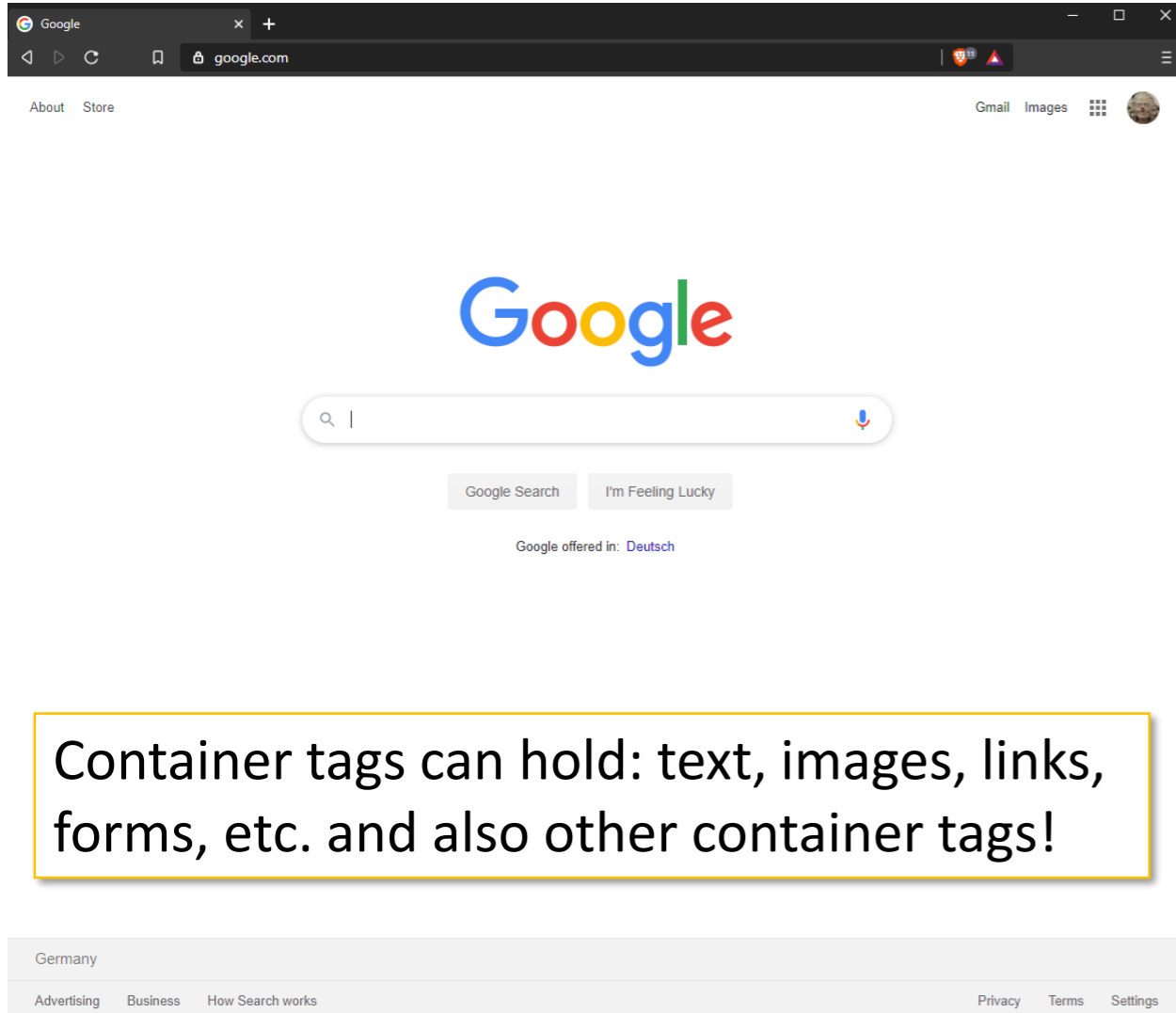


What is inside the `<BODY>` tags is rendered into the page.

HTML, CSS, JavaScript

Container Tags

<P>
<DIV>



```
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  <head>...</head>
  <body jsmodel=" " class="hp vasq big" id="gsr">
    <style>...</style>
    <style data-jiis="cc" id="gstyle">...</style>
    <style>...</style>
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      <div id="doc-info">...</div>
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      <style>...</style>
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      <div class="jhp big" id="searchform">...</div>
      <dialog class="spch-dlg" id="spch-dlg">...</dialog>
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      <div jscontroller="WgDvvc" jsdata="hE2...;;BgdNvs" jsaction="rcuQ6b:npT2md">...</div>
      <div class="content" id="main">
        <span class="ctr-p" id="body">
          <center>
            <div id="lga">...</div>
            <div style="height:118px">...</div>
            <div id="prm-pt" style="margin-top:12px">...</div>
          </center>
        </span>
        <div class="ctr-p" id="footer">...</div>
        <div id="footc">...</div>
        <div id="lb">...</div>
      </div>
      <script nonce="26x2AHsATpEG8PX+0mgVtA==">...</script>
      <div class="gb_xa">...</div>
      <style>...</style>
      <script nonce="26x2AHsATpEG8PX+0mgVtA==">...</script>
    </div>
    <textarea class="csi" name="csi" style="display:none">...</textarea>
    <script nonce="26x2AHsATpEG8PX+0mgVtA==">...</script>
    <script src="/xjs/_/js/k=xjs.s.en_GB.N-EDq1FHW8Q,0/ck=xjs.s.W0cJoh6yTZw.L.W.O/m=Fk...NChbE6QAQ/d=1/dg=2/br=1/ct=zgms/rs=ACT90oGATnID2W4-
Cd5Wk5mwi4CeFK6yfw">...</script>
    <script src="/xjs/_/js/k=xjs.s.en_GB.N-EDq1FHW8Q,0/ck=xjs.s.W0cJoh6yTZw.L.W.O/am=A_
bd,async,dvl,fEVMic,foot,lu,m,mUpTid,mu,sb_wiz,sf,sonic,spch,xz7cCd?xjs=s1" async gapi_processed="true">...</script>
    <iframe src="https://clients5.google.com/pagead/drt/dn/" aria-hidden="true" style="display:none;">...</iframe>
  </body>
</html>
```

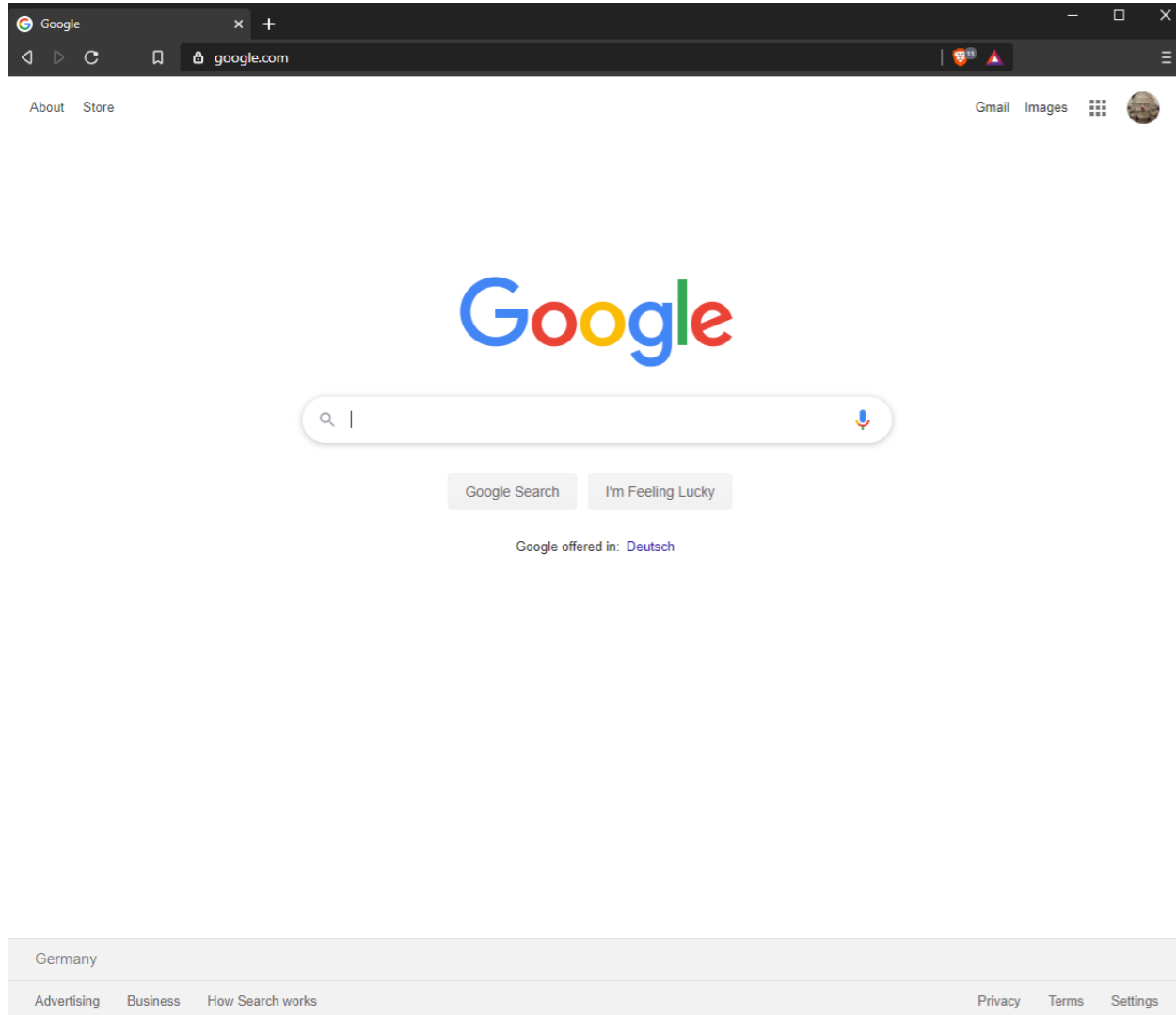
Container tags can hold: text, images, links, forms, etc. and also other container tags!

<https://stackoverflow.com/questions/30879707/why-is-a-div-called-a-div-why-is-a-span-called-a-span>

HTML, CSS, JavaScript

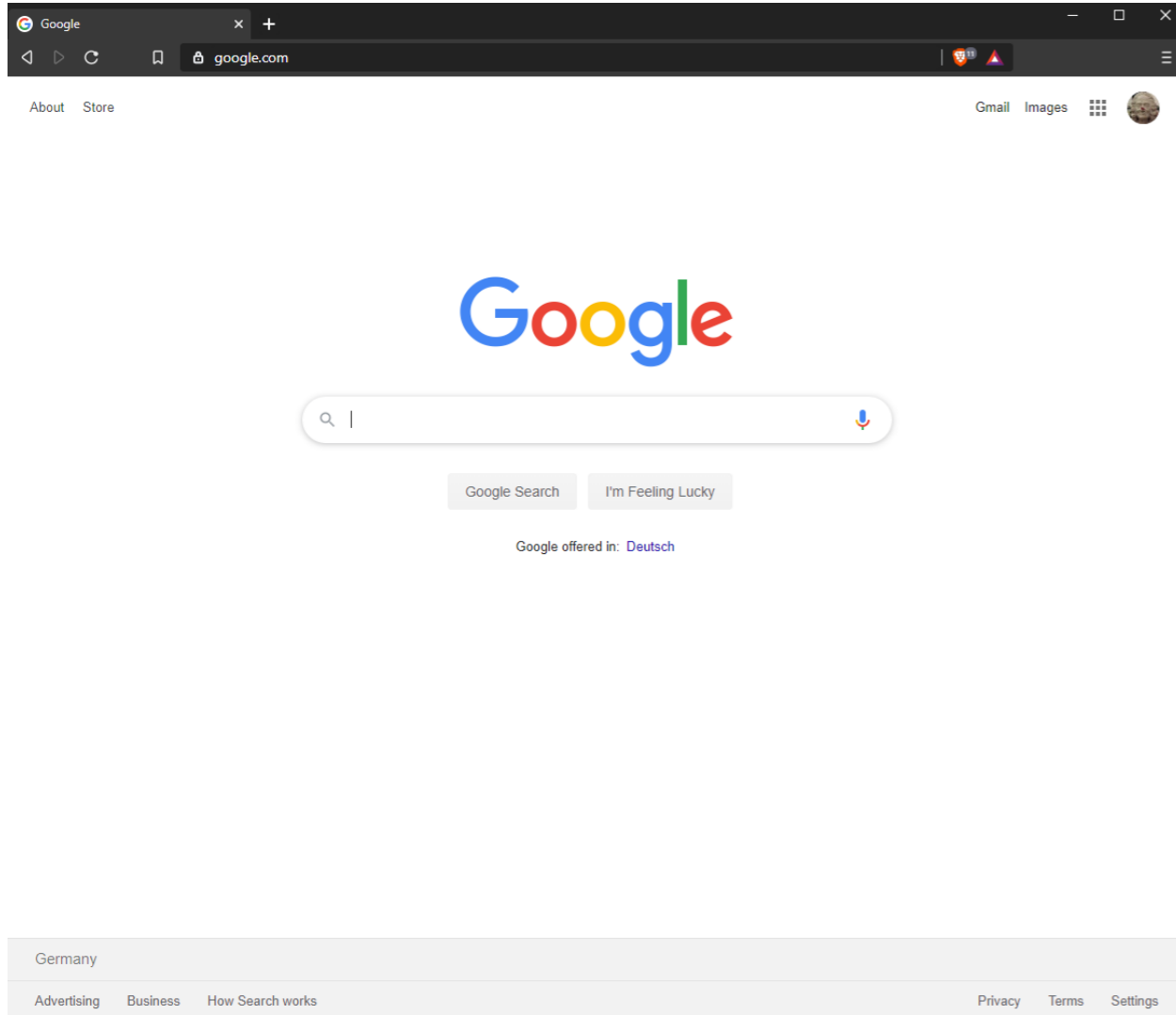
Style Tags

<STYLE>
<LINK>



```
..<!doctype html> == $0
<html itemscope itemtype="http://schema.org/WebPage" lang="en-DE">
  <head>_</head>
  <body jsmodel=" " class="hp_vase_h...>
    <style>_</style>
    <style data-jiis="cc" id="gstyle">_</style>
    <style>_</style>
    <div class="ctr-p" id="viewport">
      <div id="doc-info"></div>
      <div id="cst">_</div>
      <style>_</style>
      <div id="gb" class="gb_Sf">_</div>
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      <div jscontroller="WgDvvc" jsdata="hE2vdf;;BgdNvs" jsaction="rcuQ6b:npT2md"></div>
    <div class="content" id="main">
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        <center>
          <div id="lga">_</div>
          <div style="height:118px"></div>
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        </center>
      </span>
      <div class="ctr-p" id="footer">_</div>
      <div id="footc">_</div>
      <div id="lb"></div>
    </div>
    <script nonce="26x2AHsATpEG8PX+0mgVtA==">_</script>
    <div class="gb_xa"></div>
    <style>_</style>
    <script nonce="26x2AHsATpEG8PX+0mgVtA==">_</script>
  </div>
  <textarea class="csi" name="csi" style="display:none"></textarea>
  <script nonce="26x2AHsATpEG8PX+0mgVtA==">_</script>
  <script src="/xjs/_/js/k=xjs.s.en_GB.N-EDq1FHW8Q.0/ck=xjs.s.W0cJ0W6yTZw.L.W.0/m=Fk...NChbE6QAQ/d=1/dg=2/br=1/ct=zgms/rs=ACT90oGATnID2W4-
Cd5Wk5mwi4CeFK6yfw"></script>
  <script src="/xjs/_/js/k=xjs.s.en_GB.N-EDq1FHW8Q.0/ck=xjs.s.W0cJ0W6yTZw.L.W.0/am=A_
bd,async,dvl,fEVMic,foot,lu,m,mUpTid,mu,sb_wiz,sf,sonic,spch,xz7cCd?xjs=s1" async gapi_processed="true"></script>
  <iframe src="https://clients5.google.com/pagead/drt/dn/" aria-hidden="true" style="display: none;">_</iframe>
</body>
</html>
```

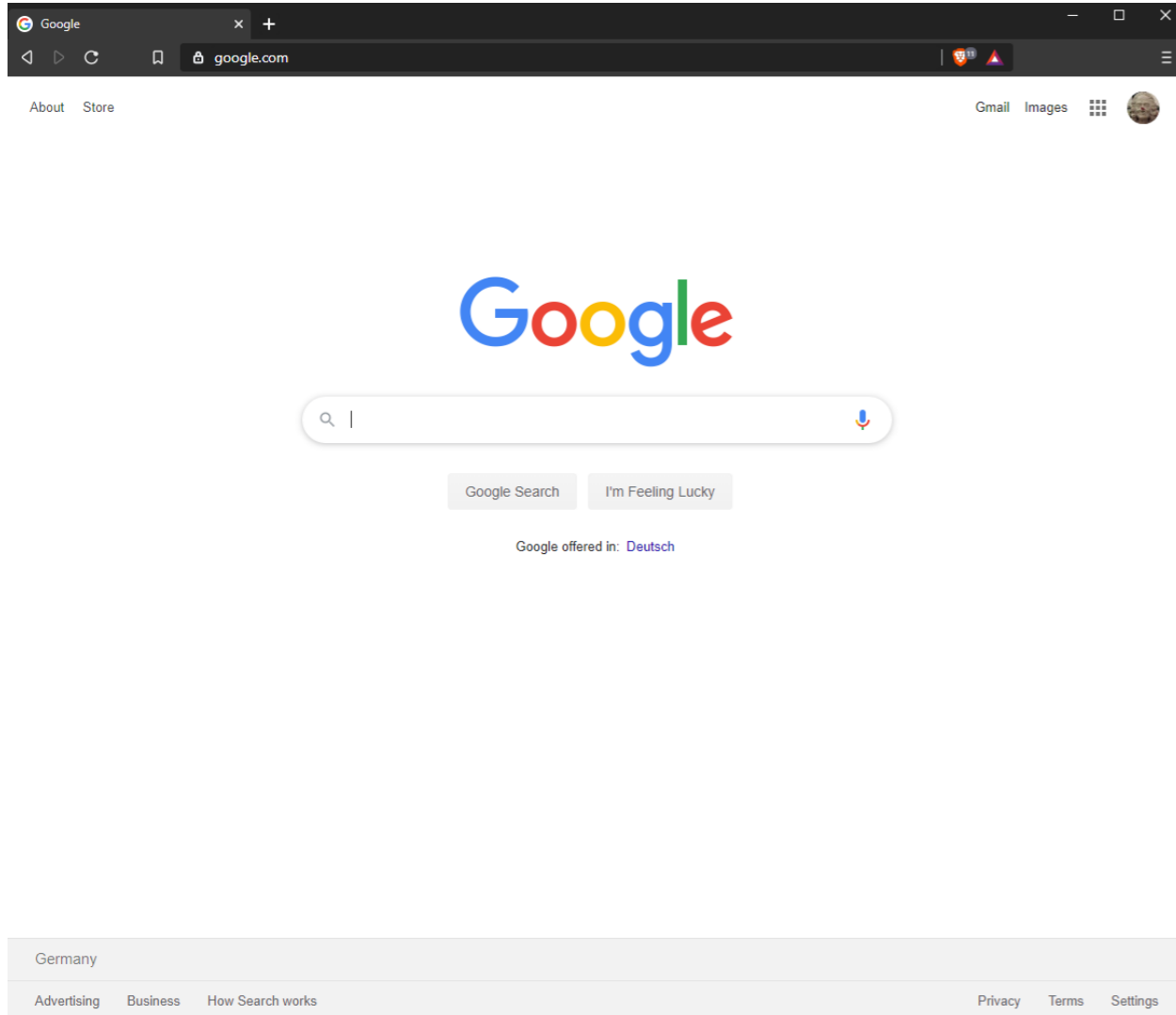
HTML, CSS, JavaScript



```
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    <style data-jiis=" " >_</style>
    <style>_</style>
    <div class="ctr-p" id="viewport">
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      <div id="cst">_</div>
      <style>_</style>
      <div id="gb" class="gb_Sf">_</div>
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      <div jscontroller="fEVMic" style="display:none" data-u...>_</div>
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            <div style="height:118px"></div>
            <div id="prm-pt" style="margin-top:12px">_</div>
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        <div id="lb"></div>
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      <style>_</style>
      <script nonce="26x2AHsATpEG8PX+0mgVtA==">_</script>
    </div>
    <textarea class="csi" name="csi" style="display:none"></textarea>
    <script nonce="26x2AHsATpEG8PX+0mgVtA==">_</script>
    <script src="/xjs/_/js/k=xjs.s.en_GB.N-EDq1FHW8Q,0/ck=xjs.s.W0cJoh6yTZw.L.W.O/m=Fk...NChbE6QAQ/d=1/dg=2/br=1/ct=zgms/rs=ACT90oGATnID2W4-
Cd5Wk5mwi4CeFK6yfw"></script>
    <script src="/xjs/_/js/k=xjs.s.en_GB.N-EDq1FHW8Q,0/ck=xjs.s.W0cJoh6yTZw.L.W.O/am=A...
bd,async,dvl,fEVMic,foot,lu,m,mUpTid,mu,sb_wiz,sf,sonic,spch,xz7cCd?xjs=s1" async gapi_processed="true"></script>
    <iframe src="https://clients5.google.com/pagead/drt/dn/" aria-hidden="true" style="display: none;">_</iframe>
  </body>
</html>
```

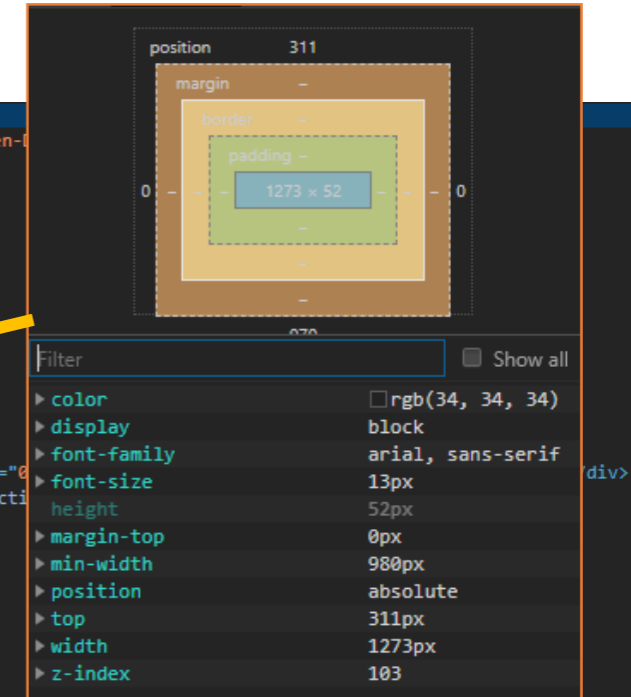
Style rules can be added at different levels and even on the element itself. JavaScript can change those rules programmatically.

HTML, CSS, JavaScript



```
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<html itemscope itemtype="http://schema.org/WebPage" lang="en-
  <head>_</head>
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    <style>_</style>
    <style data-jiis="cc" id="gstyle">_</style>
    <style>_</style>
    <div class="ctr-p" id="viewport">
      <div id="doc-info"></div>
      <div id="cst">_</div>
      <div id="go" class="gs Sf">_</div>
      <div class="jhp big" id="searchform">_</div>
      <dialog class="spch-dlg" id="spch-dlg">_</dialog>
      <div jscontroller="fEVMic" style="display:none" data-u="0">_</div>
      <div jscontroller="WgDvvc" jsdata="hE2vdf;;BgdNvs" jsacti
    <div class="content" id="main">
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        <center>
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          <div style="height:118px">_</div>
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      <div class="ctr-p" id="footer">_</div>
      <div id="footc">_</div>
    </div>
  </body>
</html>
```

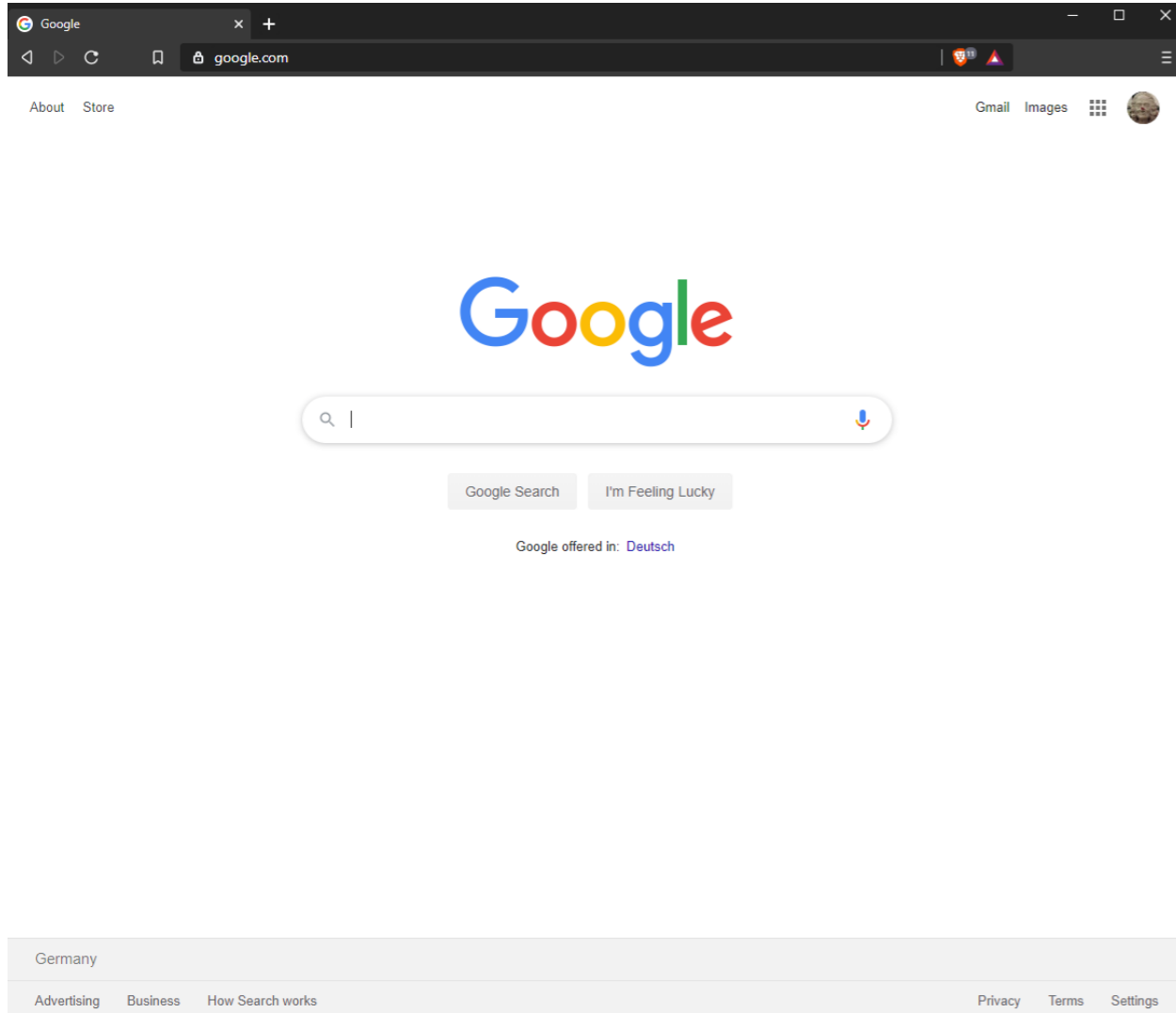
CSS (Cascading Style Sheets)



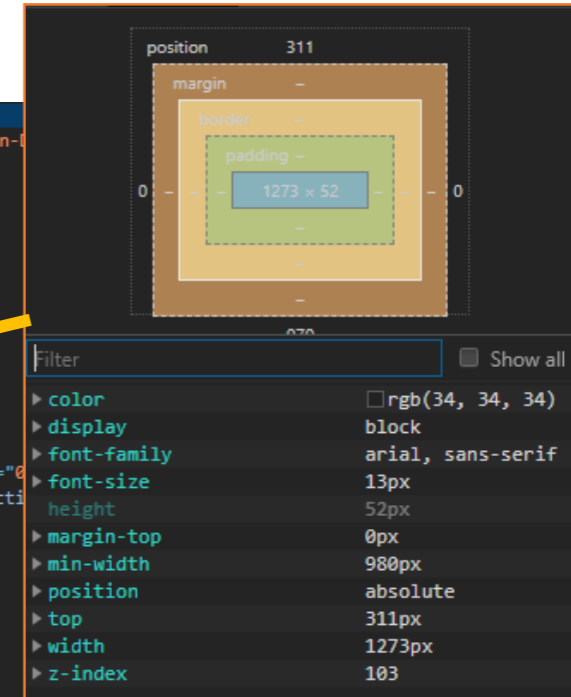
The term "**cascading**" means that you can add multiple style sheets, and the order *matters*: each style sheet extends (or overwrites) style rules defined by previous style sheets.

HTML, CSS, JavaScript

CSS (Cascading Style Sheets)



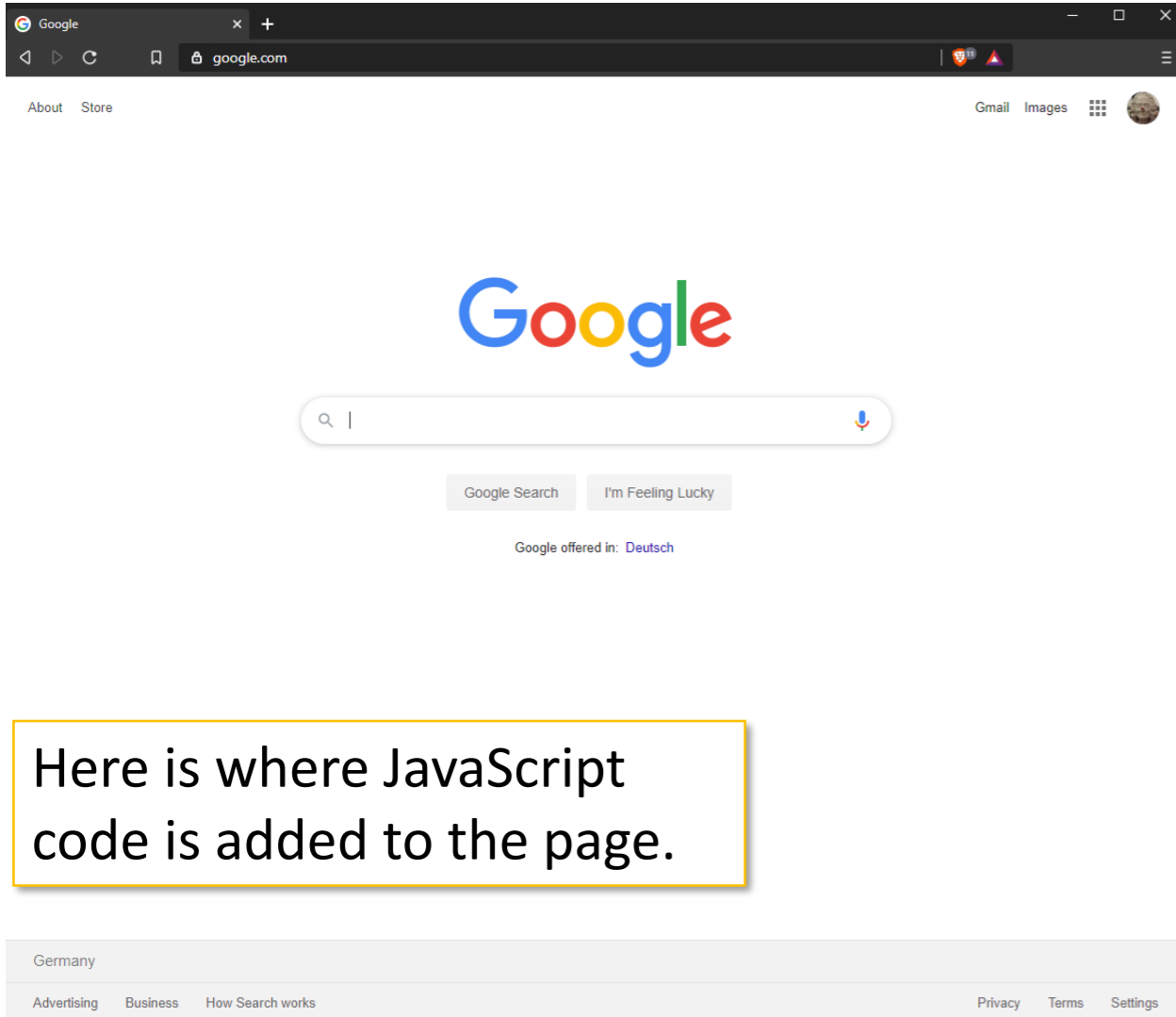
```
..<!doctype html> == $0
<html itemscope itemtype="http://schema.org/WebPage" lang="en-
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  <body jsmodel=" " class="hp vasq big" id="gsr">
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      <div id="cst">...</div>
      <div id="go" class="gs Sf">...</div>
      <div class="jhp big" id="searchform">...</div>
      <dialog class="spch-dlg" id="spch-dlg">...</dialog>
      <div jscontroller="fEVMic" style="display:none" data-u="0">...</div>
      <div jscontroller="WgDvvc" jsdata="hE2vdf;BgdNvs" jsacti...</div>
      <div class="content" id="main">
        <span class="ctr-p" id="body">
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          </center>
        </span>
      <div class="ctr-p" id="footer">...</div>
      <div id="footc">...</div>
    </body>
  </html>
```



What is displayed above is the final cascade of all the CSS rules for the element with classes "jhp" and "big", and with id "searchform".

```
...</script>
<script src="/xjs/_/js/k=xjs.s.en_GB.N-EDq1FHW8Q.0/ck=xjs.s.W0cJoh6yTZw.L.W.O/am=A_
bd,async,dvl,fEVMic,foot,lu,m,mUpId,mu,sb_wiz,sf,sonic,spch,xz7cCd?xjs=s1" async gapi_processed="true"></script>
<iframe src="https://clients5.google.com/pagead/drt/dn/" aria-hidden="true" style="display: none;"></iframe>
</body>
</html>
```

HTML, CSS, JavaScript



Here is where JavaScript code is added to the page.

```
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      <style>...</style>
      <div id="gb" class="gb_Sf">...</div>
      <div class="jhp big" id="searchform">...</div>
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    </div>
    <script nonce="26x2AHsATpEG8PX+0mgVtA==">...</script>
    <div class="gb_xa">...</div>
    <style>...</style>
    <script nonce="26x2AHsATpEG8PX+0mgVtA==">...</script>
    <script nonce="26x2AHsATpEG8PX+0mgVtA==">...</script>
    <script src="/xjs/_/js/k=xjs.s.en_GB.N-EDq1FHW8Q.0/ck=xjs.s.W0cJ0W6yTZw.L.W.O/m=Fk...NChbE6QAQ/d=1/dg=2/br=1/ct=zgms/rs=ACT90oGATnID2W4-Cd5Wk5mwi4CeFK6yfw">...</script>
    <script src="/xjs/_/js/k=xjs.s.en_GB.N-EDq1FHW8Q.0/ck=xjs.s.W0cJ0W6yTZw.L.W.O/am=A...bd,async,dvl,fEVMic,foot,lu,m,mUpTid,mu,sb_wiz,sf,sonic,spch,xz7cCd?xjs=s1" async gapi_processed="true">...</script>
    <iframe src="https://clients5.google.com/pagead/drt/dn/" aria-hidden="true" style="display: none;">...</iframe>
  </body>
</html>
```

Script Tags
<SCRIPT>

Hands On 1: Messing Around with Google.Com



Go to Google.com and manipulate the page elements programmatically:

```
// Fetch the HTML element with given id.  
var logo = document.getElementById("hplogo");
```

Hands On 1: Messing Around with Google.Com



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```
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```



How to change the image displayed?

Hands On 1: Messing Around with Google.Com



Go to Google.com and manipulate the page elements programmatically:

```
// Fetch the HTML element with given id.  
var logo = document.getElementById("hplogo");  
// Change one of its attributes (pick any image you like).  
logo.srcset = "https://nodegame.org/images/Logo_Square_with_dots.png";
```

Hands On 2: Messing Around with Google.Com



Go to Google.com and manipulate the page elements programmatically:

```
// Fetch the HTML element with given id.
var logo = document.getElementById("hplogo");
// Change one of its attributes (pick any image you like).
logo.srcset = "https://nodegame.org/images/Logo_Square_with_dots.png";
// Defines an onclick event-handler (anonymous function).
logo.onclick = function() {

    Let's do Something Here!

};
```

Hands On 2: Messing Around with Google.Com



Go to Google.com and manipulate the page elements programmatically:

```
// Fetch the HTML element with given id.
var logo = document.getElementById("hplogo");
// Change one of its attributes (pick any image you like).
logo.srcset = "https://nodegame.org/images/Logo_Square_with_dots.png";
// Defines an onclick event-handler (anonymous function).
logo.onclick = function() {
    // Redirect to a new page.
    window.location.href = "https://nodegame.org";
};
```

JavaScript Commands 1



```
// Create a new DIV element.  
var myDiv = document.createElement("div");
```


JavaScript Commands 1



```
// Create a new DIV element.  
var myDiv = document.createElement("div");  
  
// Add something inside.  
myDiv.innerHTML = 'I am cool div.';
```

JavaScript Commands 1



```
// Create a new DIV element.  
var myDiv = document.createElement("div");  
  
// Add something inside.  
myDiv.innerHTML = 'I am cool div.';  
  
// Add the element to the page.  
document.body.appendChild(myDiv);
```

JavaScript Commands 2



```
// Add a SPAN element inside our DIV.  
var mySpan = document.createElement("span");
```

JavaScript Commands 2



```
// Add a SPAN element inside our DIV.  
var mySpan = document.createElement("span");
```

Note! `<p>` and `<div>` are "block" elements, while `` is an inline element. *What does it mean?* If you append several `` elements, they will be displayed one *next to* the other; if you append several `<div>` elements they will be displayed one *below* the other. So, generally `` elements are nested inside `<DIV>`, and not vice versa.

JavaScript Commands 2



```
// Add a SPAN element inside our DIV.  
var mySpan = document.createElement("span");
```

Note! <p> and <div> are "block" elements, while is an inline element. *What does it mean?* If you append several elements, they will be displayed one *next to* the other; if you append several <div> elements they will be displayed one *below* the other. So, generally elements are nested inside <DIV>, and not vice versa.



However, did you know that you can change this behavior with a CSS "display" rule?

JavaScript Commands 2



```
// Add a SPAN element inside our DIV.  
var mySpan = document.createElement("span");  
  
// Add something inside.  
mySpan.innerHTML = 'I am a child of myDiv.';
```

JavaScript Commands 2



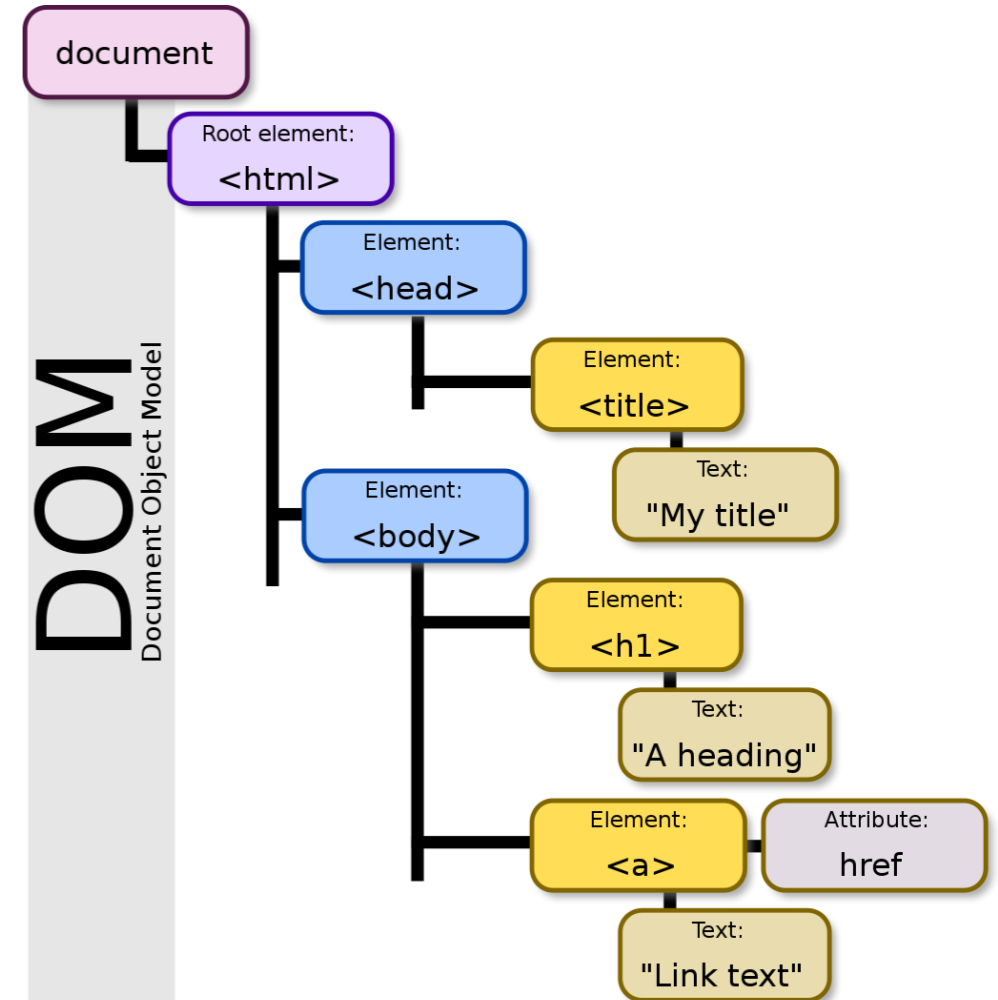
```
// Add a SPAN element inside our DIV.  
var mySpan = document.createElement("span");  
  
// Add something inside.  
mySpan.innerHTML = 'I am a child of myDiv.';  
  
// Add the element to the page.  
myDiv.appendChild(mySpan);
```

More on appendChild



Every element in the DOM tree has a "parent" element and might have one or more "children" elements.

`appendChild` is a method available in every HTML element to add a *new* element **at the bottom** of the list of its children.



More on appendChild

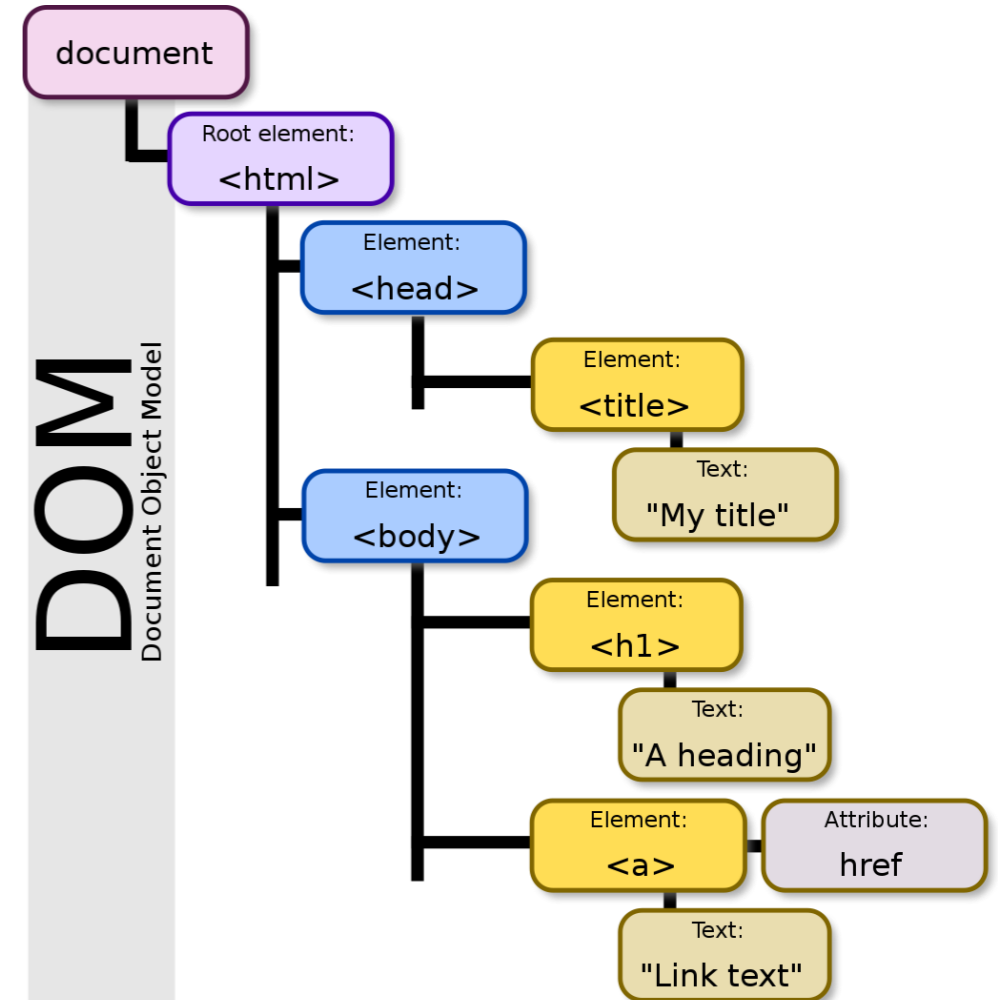


Every element in the DOM tree has a "parent" element and might have one or more "children" elements.

`appendChild` is a method available in every HTML element to add a *new* element **at the bottom** of the list of its children.



Bonus question. What happens if you append an element that is already appended somewhere in the DOM under a new parent?



JavaScript Commands 3



```
// Let's start over. Clear the content of the body.
```



Any Idea How to Do It?

JavaScript Commands 3



```
// Let's start over. Clear the content of the body.  
document.body.innerHTML = '';
```

JavaScript Commands 3



```
// Let's start over. Clear the content of the body.  
document.body.innerHTML = '';
```

```
// Re-add myDiv.  
document.body.appendChild(myDiv);
```

JavaScript Commands 3



```
// Let's start over. Clear the content of the body.  
document.body.innerHTML = '';  
  
// Re-add myDiv.  
document.body.appendChild(myDiv);  
  
// Change the font color.  
myDiv.style.color = 'red';
```

JavaScript Commands 3



```
// Let's start over. Clear the content of the body.  
document.body.innerHTML = '';
```

```
// Re-add myDiv.  
document.body.appendChild(myDiv);
```

```
// Change the font color.  
myDiv.style.color = 'red';
```



**Will it Change the Background
Of the SPAN as well?**

```
// Change the background color.  
myDiv.style.background = 'lightblue';
```

JavaScript Commands 3



```
// Change the span background color  
mySpan.style.background = 'white';
```

JavaScript Commands 3



```
// Change the span background color  
mySpan.style.background = 'white';
```

```
// Make font size larger.  
myDiv.style.font-size = '30px';
```

CSS and JavaScript are *not fully compatible*.

Rule **font-size** cannot be written in plain JavaScript, because JavaScript will try to make a subtraction.

JavaScript Commands 3



```
// Change the span background color  
mySpan.style.background = 'white';
```

```
// Make font size larger.  
myDiv.style.font-size = '30px';
```

```
// The - (minus) is an arithmetic operator.  
// We must access the object as an array, but  
instead of the number, we give the property name.  
myDiv.style['font-size'] = '30px';
```

px means pixels.

JavaScript Commands 3



```
// Change the visibility of the element on the page.  
myDiv.style.display = 'none';  
myDiv.style.display = ''; // or 'block'
```

The HTML Page Elements



DOM Tree

```
<HTML>  
  <HEAD>  
    <LINK>  
    <SCRIPT>  
  </HEAD>  
  <BODY>  
  ...  
  </BODY>  
</HTML>
```

Presentation Tags

```
<P>  
<DIV>  
<SPAN>
```

Images and Links

```
<IMG>  
<A>
```

Forms

```
<INPUT>  
<TEXTAREA>
```

Attributes

```
<DIV id="header">  
<SPAN class="bold">  
<IMG SRC="image.jpg" />  
<A HREF="newpage.htm">  
<INPUT disabled>
```

CSS Declarations

```
display: none;
```

Attention!



To successfully learn JavaScript is important that you give me your FULL attention when I am teaching.

Did you give me your full attention?

YES

NO

Attention!



Do You want to learn more JavaScript?

YES

NO