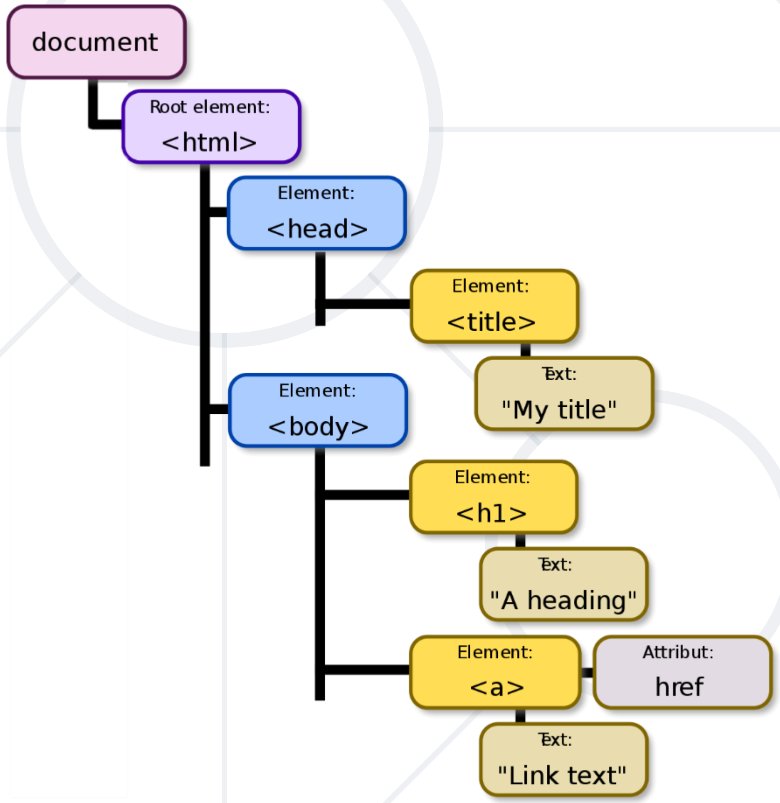
DOM Manipulation

Create / Delete DOM Elements, Handle Browser Events



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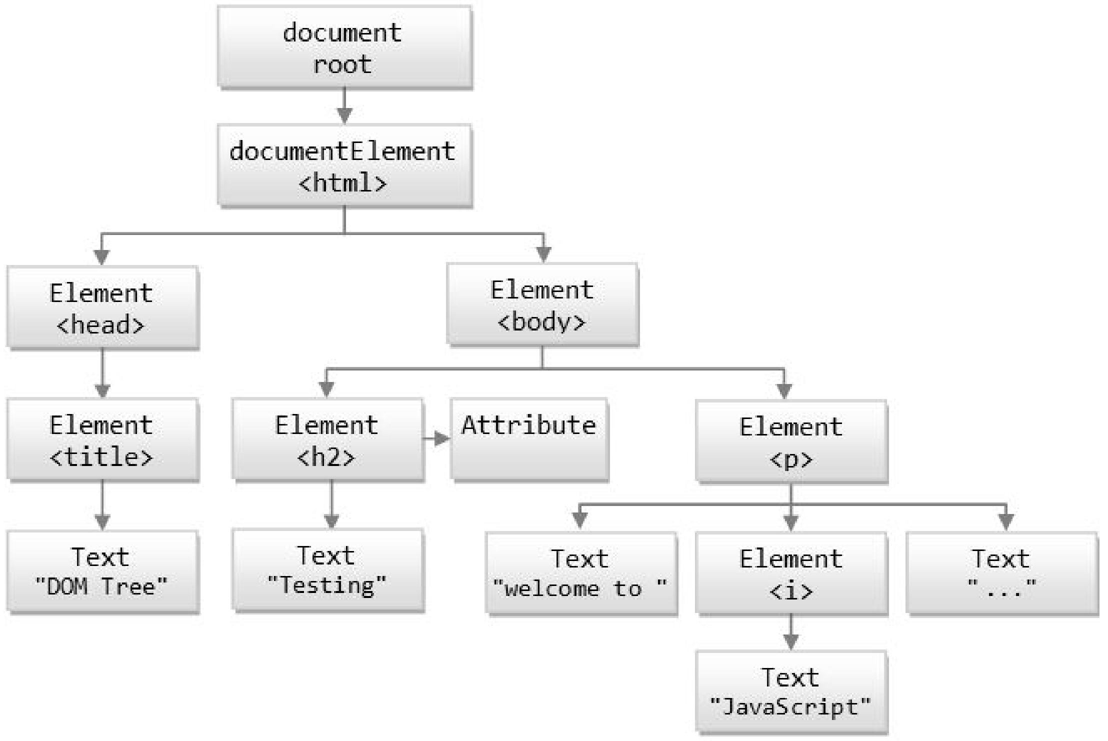


DOM Manipulation

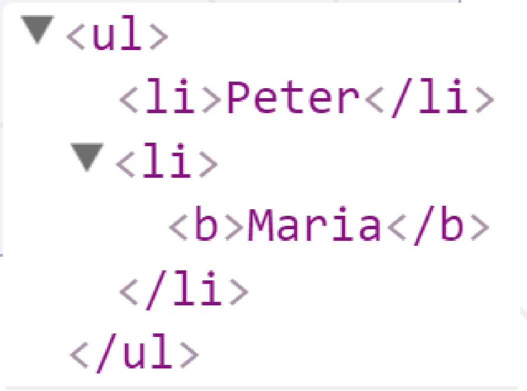
Modify the DOM Tree

Creating New DOM Elements

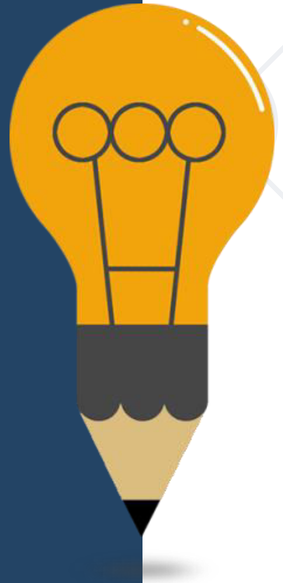
- HTML elements are created with **`document.createElement`**
  - This is called a **Factory Pattern**
- Variables holding HTML elements are **live**:
  - If you **modify** the contents of the variable, the DOM is **updated**
  - If you **insert** it somewhere in the DOM, the original is **moved**
- Text added to **`textContent`** will be **escaped**
- Text added to **`innerHTML`** will be **parsed** and turned into actual HTML elements → beware of **XSS attacks**!

Creating New DOM Elements: Examples

```
let list = document.createElement("ul");

let liPeter = document.createElement("li");
liPeter.textContent = "Peter";
list.appendChild(liPeter);

let liMaria = document.createElement("li");
liMaria.innerHTML = "<b>Maria</b>";
list.appendChild(liMaria);

document.body.appendChild(list);
```

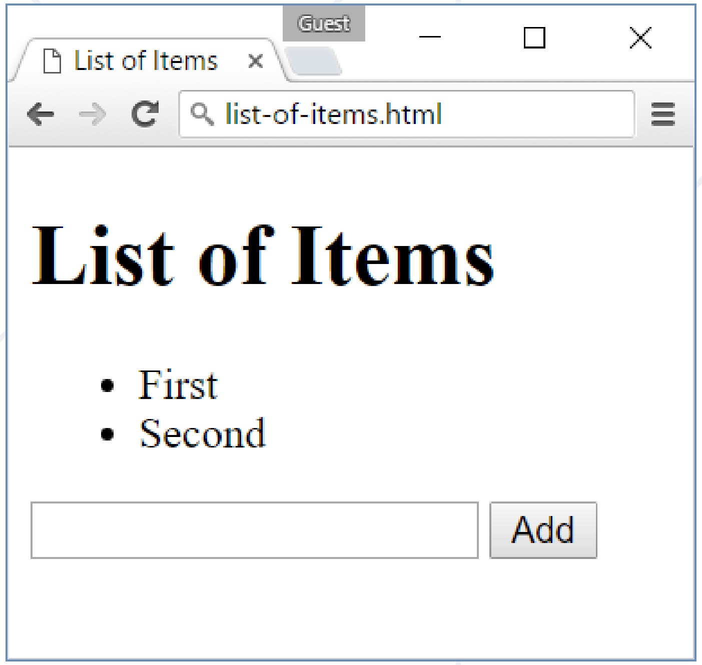


```
▼<ul>
   <li>Peter</li>
  ▼<li>
     <b>Maria</b>
   </li>
 </ul>
```



Problem: List of Items

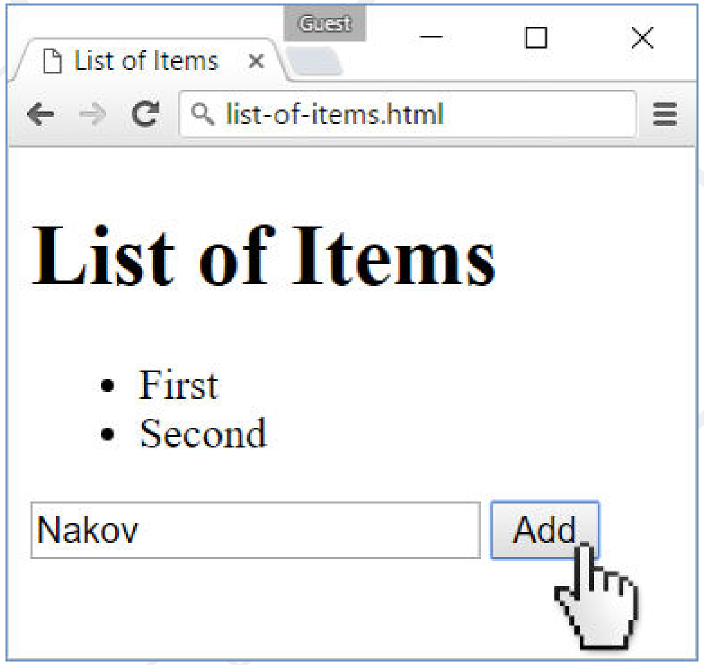
- Create a HTML page holding a **list of items** + **text box** + **button** for adding more items to the list
  - Write a **JS function** to append the specified text to the list



List of Items

- First
- Second

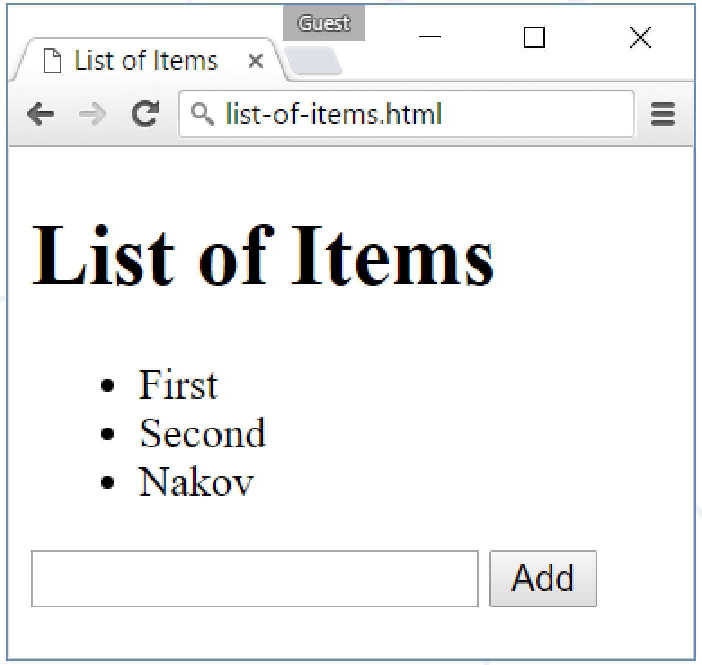
Add



List of Items

- First
- Second

Nakov Add



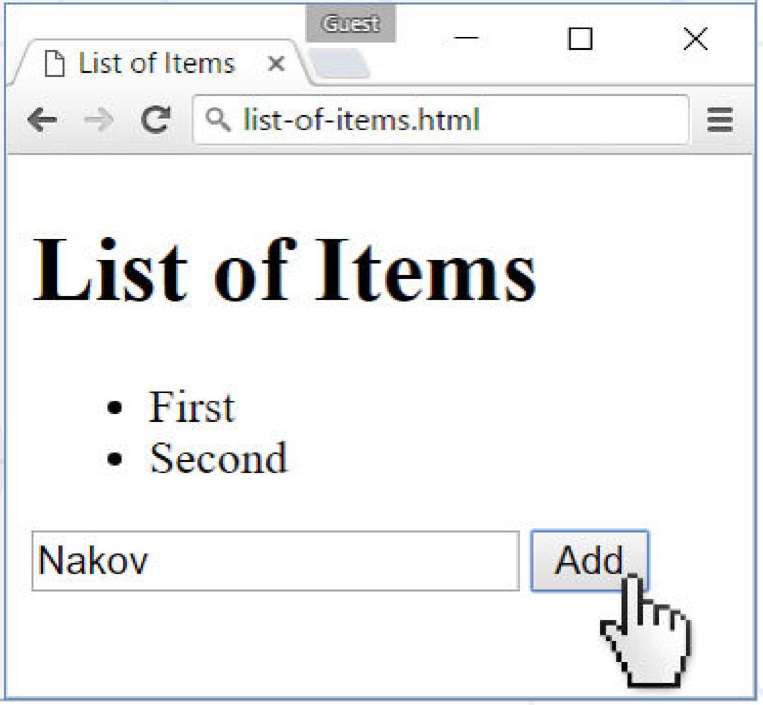
List of Items

- First
- Second
- Nakov

Add

Problem: List of Items – HTML

```
<h1>List of Items</h1>
<ul id="items"><li>First</li><li>Second</li></ul>
<input type="text" id="newItemText" />
<input type="button" value="Add"
  onclick="addItem()">
<script>
  function addItem() {
    // TODO: add new item to the list
  }
</script>
```



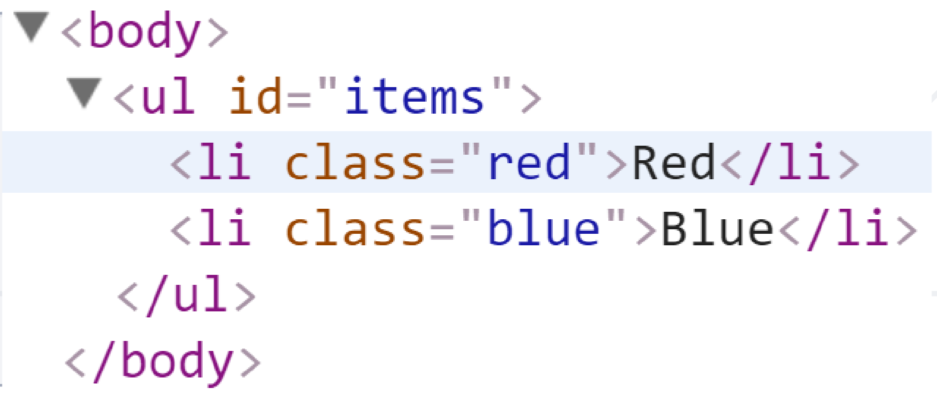
Solution: List of Items

```
function addItem() {
  let text =
    document.getElementById('newItemText').value;
  let li = document.createElement("li");
  li.appendChild(document.createTextNode(text));
  document.getElementById("items").appendChild(li);
  document.getElementById('newItemText').value = '';
}
```

Check your solution here: https://judge.softuni.bg/Contests/328

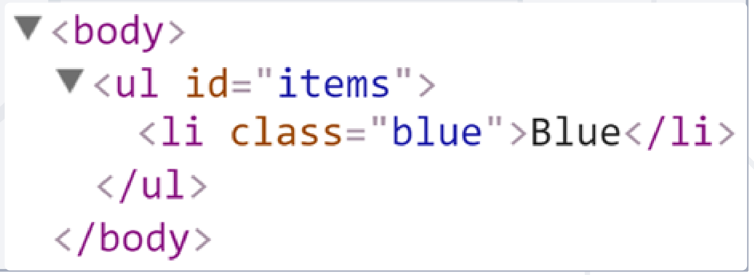
Deleting DOM Elements

```html
<ul id="items">
  <li class="red">Red</li>
  <li class="blue">Blue</li>
</ul>
```



```
▼<body>
  ▼<ul id="items">
     <li class="red">Red</li>
     <li class="blue">Blue</li>
   </ul>
 </body>
```

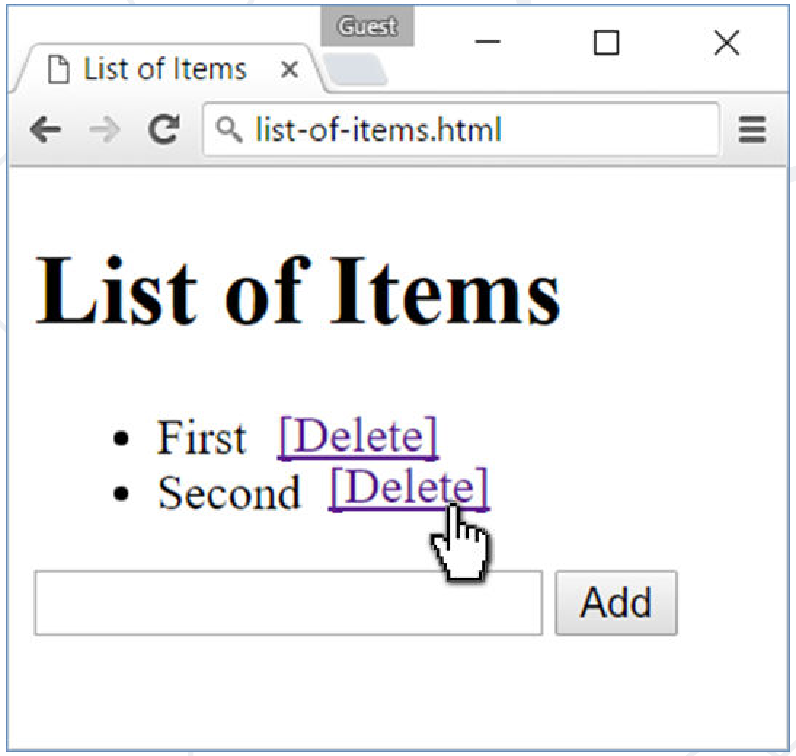
```javascript
let redElements =
  document.querySelectorAll("#items li.red");
redElements.forEach(li => {
  li.parentNode.removeChild(li);
});
```



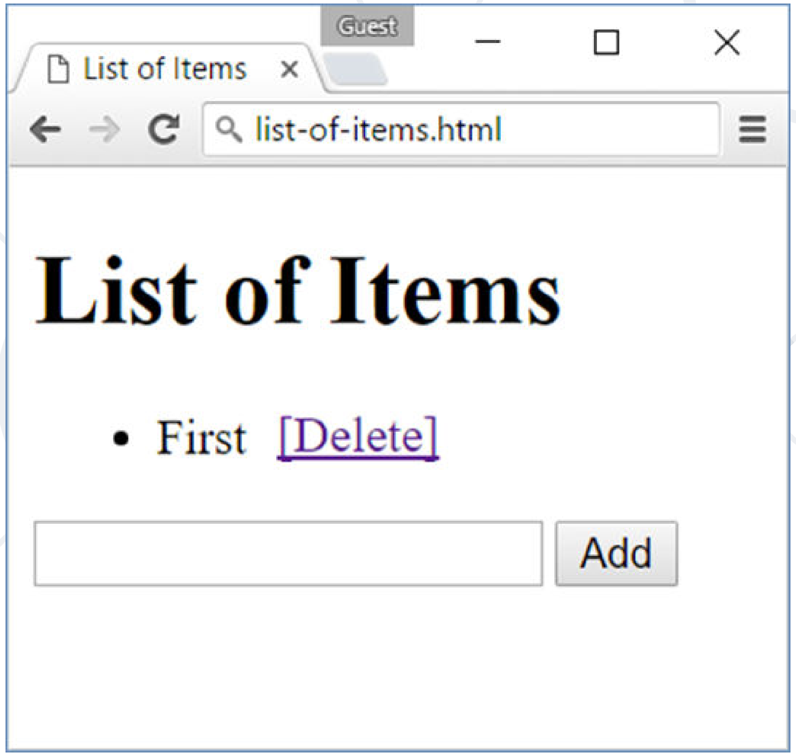
```
▼<body>
  ▼<ul id="items">
     <li class="blue">Blue</li>
   </ul>
 </body>
```

Problem: Add / Delete Items

- Extend the previous problem
  - Implement **[Delete]** action as link after each list item


List of Items

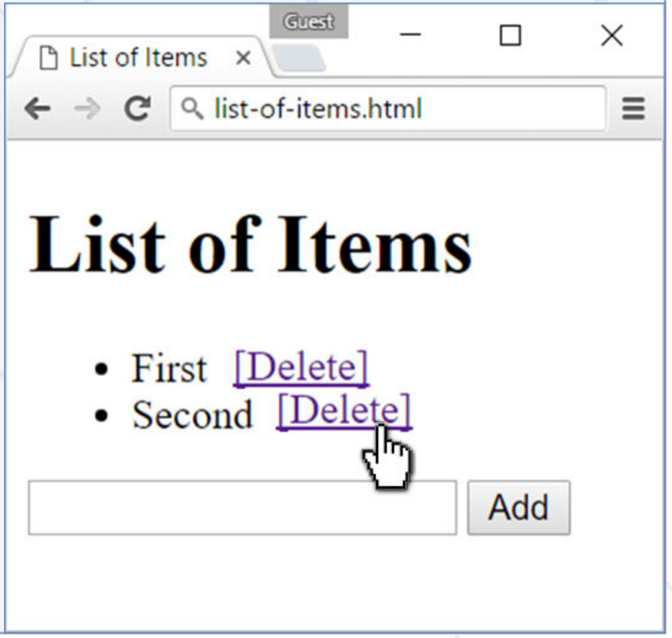
- First [Delete]
- Second [Delete]


List of Items

- First [Delete]

Problem: Add / Delete Items – HTML

```
<h1>List of Items</h1>
<ul id="items"></ul>
<input type="text" id="newText" />
<input type="button" value="Add"
  onclick="addItem()">
<script>
  function addItem() { …
    function deleteItem() {…}
  }
</script>
```



List of Items

list-of-items.html

List of Items

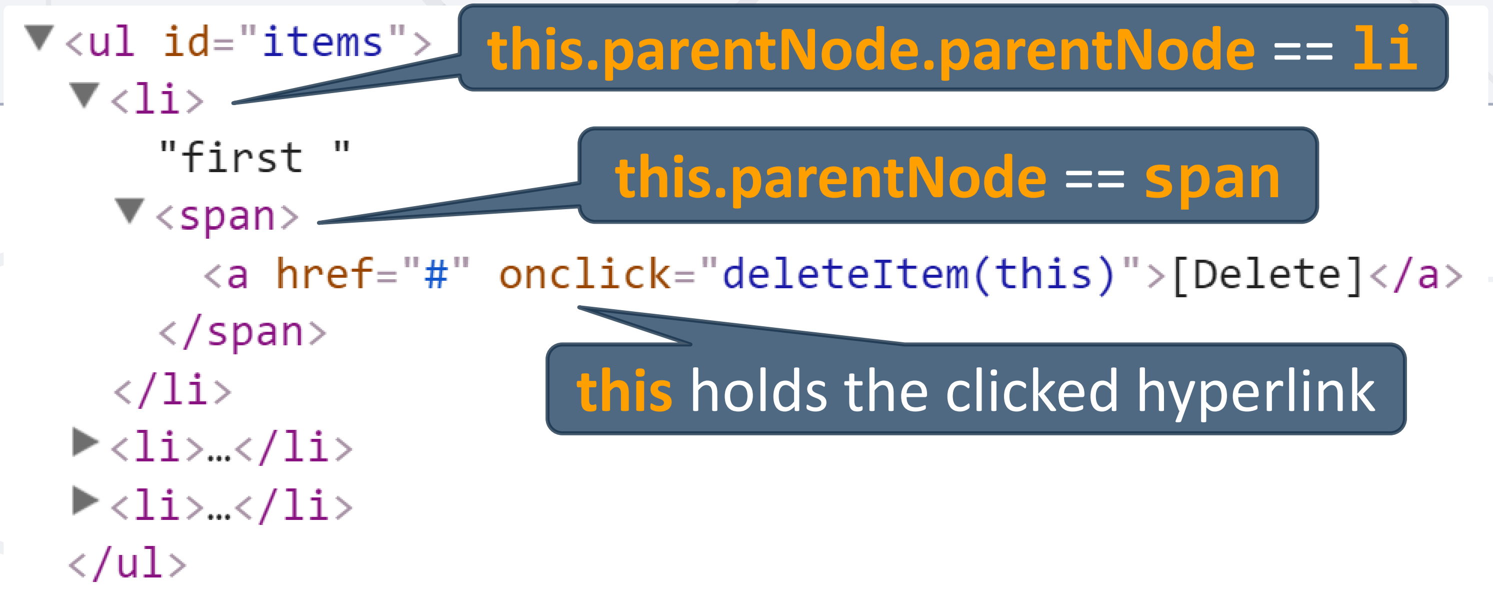
- First [Delete]
- Second [Delete]

Solution: Add / Delete Items

```
function addItem() {
  let text = document.getElementById('newText').value;
  let li = document.createElement("li");
  li.appendChild(document.createTextNode(text + " "));
  let span = document.createElement('span');
  span.innerHTML = "<a href='#'>[Delete]</a>";
  span.firstChild.addEventListener('click', deleteItem);
  li.appendChild(span);
  document.getElementById("items").appendChild(li);
  document.getElementById('newText').value = '';
```

Solution: Add / Delete Items (2)

```
  function deleteItem() {
    let li = this.parentNode.parentNode;
    let ul = li.parentNode;
    ul.removeChild(li);
  }
}
```



```
▼<ul id="items">
  ▼<li>
      "first "
    ▼<span>
        <a href="#" onclick="deleteItem(this)">[Delete]</a>
      </span>
    </li>
  ▶<li>…</li>
  ▶<li>…</li>
  </ul>
```

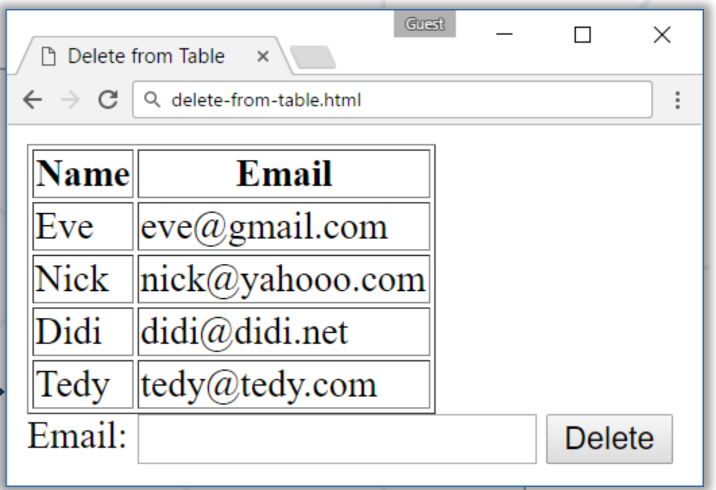
this.parentNode.parentNode == li
this.parentNode == span
this holds the clicked hyperlink

Check your solution here: https://judge.softuni.bg/Contests/328

Problem: Delete from Table

SoftUni Foundation

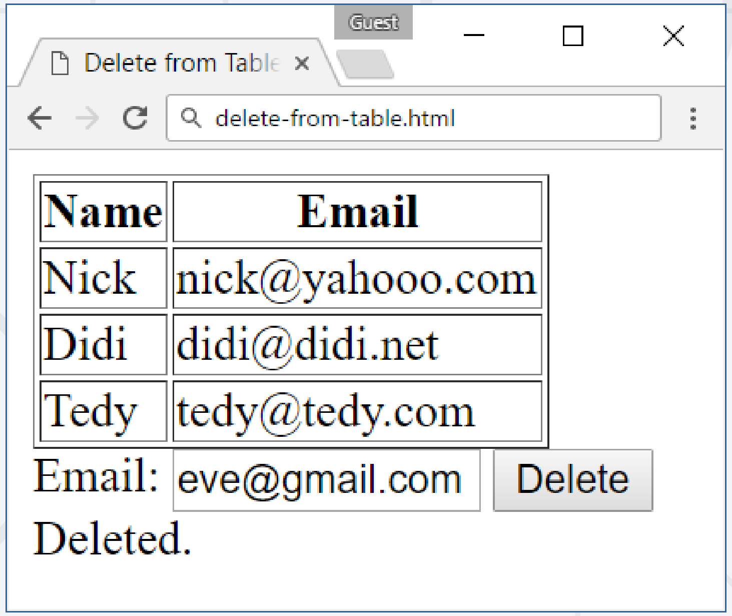
```
<table border="1" id="customers">
 <tr><th>Name</th><th>Email</th></tr>
 <tr><td>Eve</td><td>eve@gmail.com</td></tr>
 <tr><td>Nick</td><td>nick@yahooo.com</td></tr>
 <tr><td>Didi</td><td>didi@didi.net</td></tr>
 <tr><td>Tedy</td><td>tedy@tedy.com</td></tr>
</table>
Email: <input type="text" name="email" />
<button onclick="deleteByEmail()">Delete</button>
<div id="result" />
```



Name	Email
Eve	eve@gmail.com
Nick	nick@yahooo.com
Didi	didi@didi.net
Tedy	tedy@tedy.com

Solution: Delete from Table

```
function deleteByEmail() {
  let email = document.getElementsByName("email")[0].value;
  let secondColumn = document.querySelectorAll(
    "#customers tr td:nth-child(2)");
  for (let td of secondColumn)
    if (td.textContent == email) {
      let row = td.parentNode;
      row.parentNode.removeChild(row);
      document.getElementById('result').
        textContent = "Deleted.";
      return;
    }
  document.getElementById('result').textContent = "Not found.";
}
```



Name	Email
Nick	nick@yahooo.com
Didi	didi@didi.net
Tedy	tedy@tedy.com

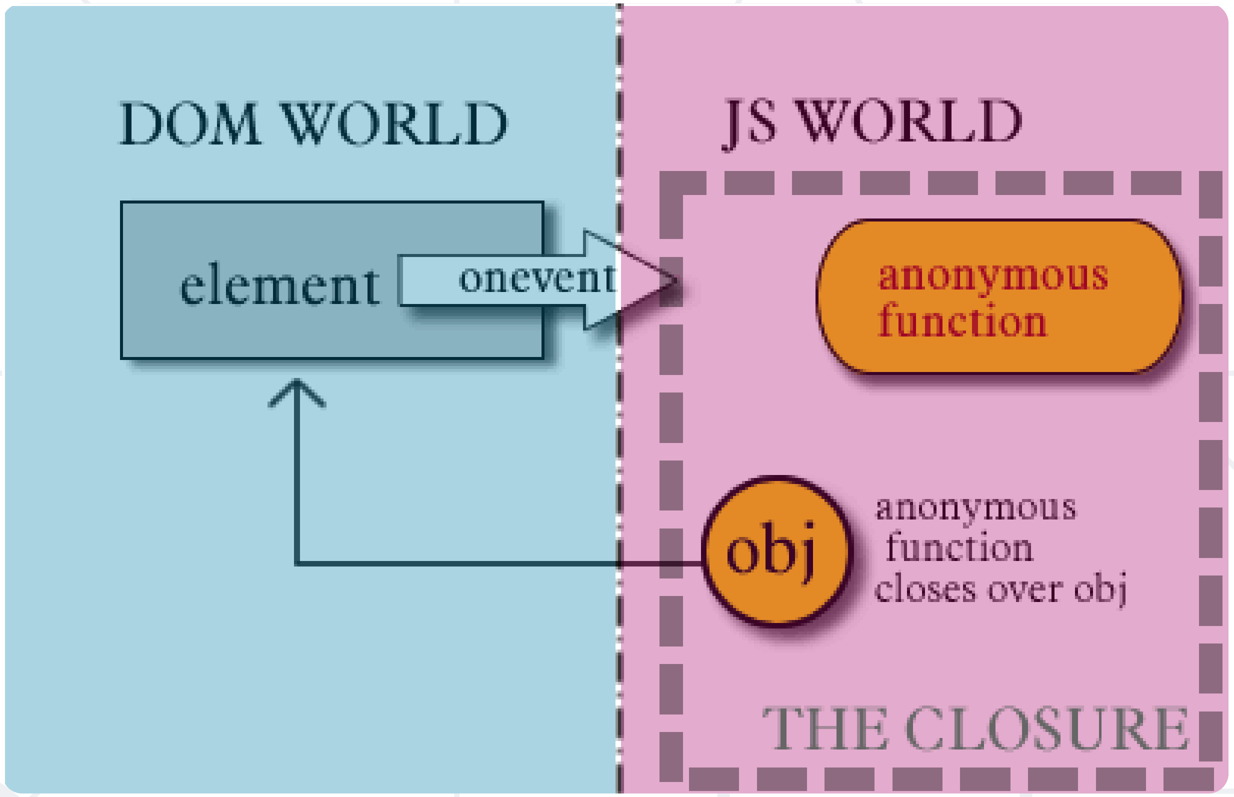
Email: eve@gmail.com Delete

Deleted.

Check your solution here: https://judge.softuni.bg/Contests/328

Practice: DOM and Events

Live Exercises in Class (Lab)



Handling Events

Browser Events and DOM Events

Handling Events in JS

- Browsers send **events** to notify the JS code of interesting things that have taken place

```
<div id='text'>Some text</div>
```

```
let div = document.getElementById('text');
div.onmouseover = function(event) {
  event.target.style.border = "3px solid green";
}
div.onmouseout = function() {
  this.style.border = ""; // this === event.target
}
```

Event Types in DOM API

- **Mouse** events

```
click
mouseover
mouseout
mousedown
mouseup
```

- **Touch** events

```
touchstart
touchend
touchmove
touchcancel
```

- **DOM / UI** events

```
load (finished loading)
unload (exit from page)
resize (window resized)
dragstart / drop
```

- **Keyboard** events

```
keydown
keypress (emit char)
keyup
```

- **Focus** events

```
focus (got focus)
blur (lost focus)
```

- **Form** events

```
input (value changed)
change (change + leave)
submit (form sent)
reset (form reset)
```

Learn more at https://developer.mozilla.org/docs/Web/Events

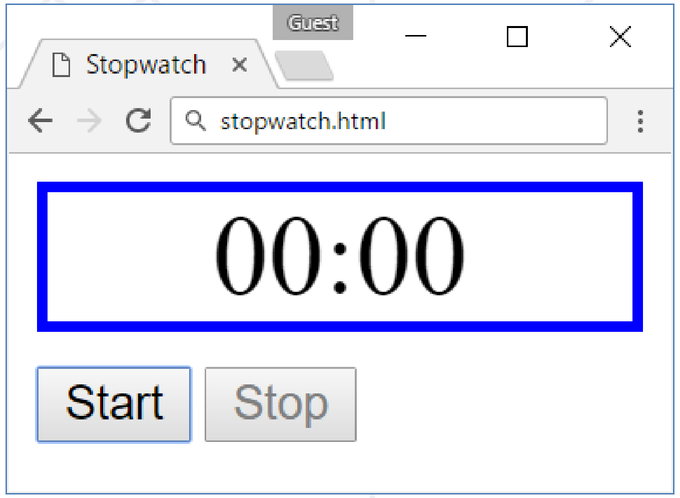
Add / Remove Event Handler

```
let textbox = document.createElement('input');
textbox.type = 'text';
textbox.value = "I am a text box";
document.body.appendChild(textbox);

textbox.addEventListener('focus', focusHandler);

function focusHandler(event) {
  textbox.value = "Event handler removed";
  textbox.removeEventListener('focus', focusHandler);
}
```

Subscribe to events like this, don't use **onclick** / **onfocus**

Problem: Stopwatch

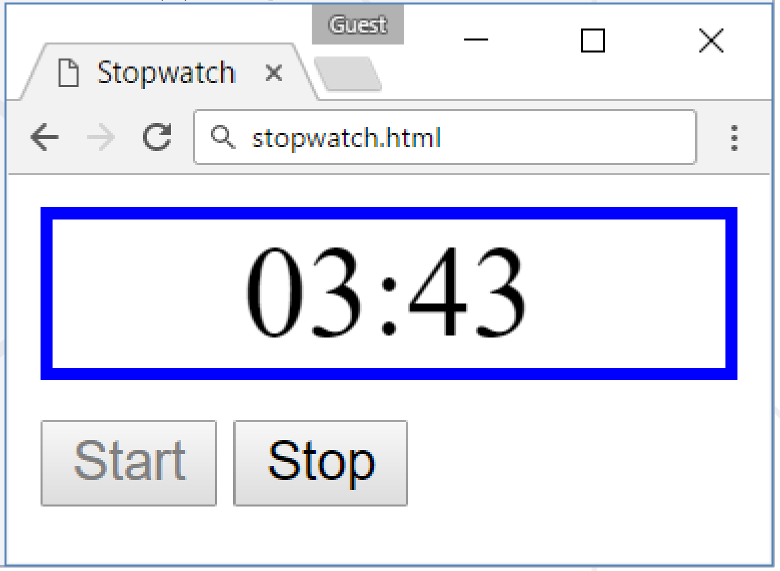
- A HTML page holds **time-box** + **[Start]** + **[Stop]** buttons
  - Implement the missing JS function **stopwatch()**
    - Increase the time at each second
    - Disable / enable buttons



```
<div id="time" style="border:3px
   solid blue; text-align:center;
   font-size:2em; margin-
   bottom:10px">00:00</div>
<button id="startBtn">Start</button>
<button id="stopBtn"
   disabled="true">Stop</button>
<script>window.onload = function() {
   stopwatch(); }</script>
```

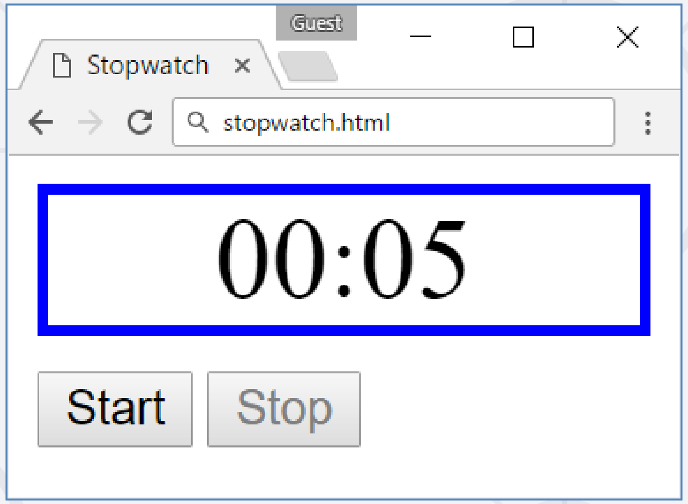
Solution: Stopwatch

```
function stopwatch() {
  let time, intervalID;
  let startBtn = document.getElementById('startBtn');
  let stopBtn = document.getElementById('stopBtn');

  startBtn.addEventListener('click', function() {
    time = -1;
    incrementTime();
    intervalID = setInterval(
      incrementTime, 1000);
    startBtn.disabled = true;
    stopBtn.disabled = false;
  });
```



Solution: Stopwatch (2)

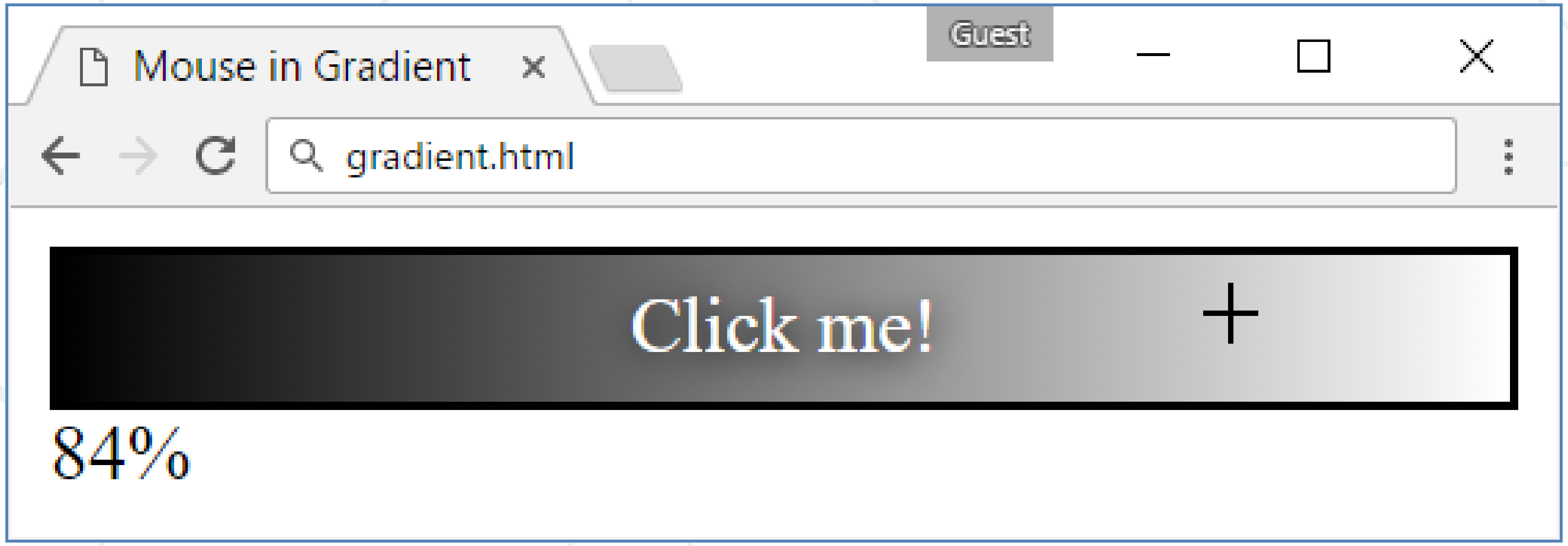
```
  stopBtn.addEventListener('click', function() {
    clearInterval(intervalID);
    startBtn.disabled = false;
    stopBtn.disabled = true;
  });

  function incrementTime() {
    time++;
    document.getElementById('time').textContent =
      ("0" + Math.trunc(time / 60)).slice(-2) +
      ':' + ("0" + (time % 60)).slice(-2);
  }
}
```



Check your solution here: https://judge.softuni.bg/Contests/328

Problem: Mouse in Gradient

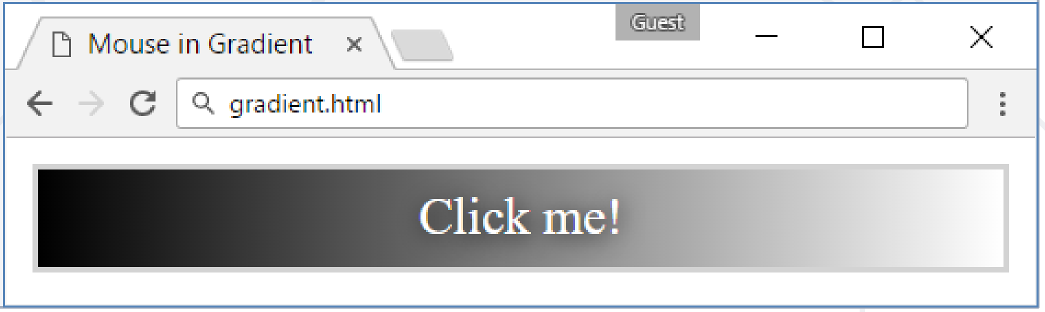
- A HTML page holds **linear gradient** box
  - Moving the mouse should show **percentage** [0% … 100%], depending on the **location of mouse**
  - Left side → **0%**; middle → **50%**; right side → **100%**



Click me!
84%

Problem: Mouse in Gradient – HTML

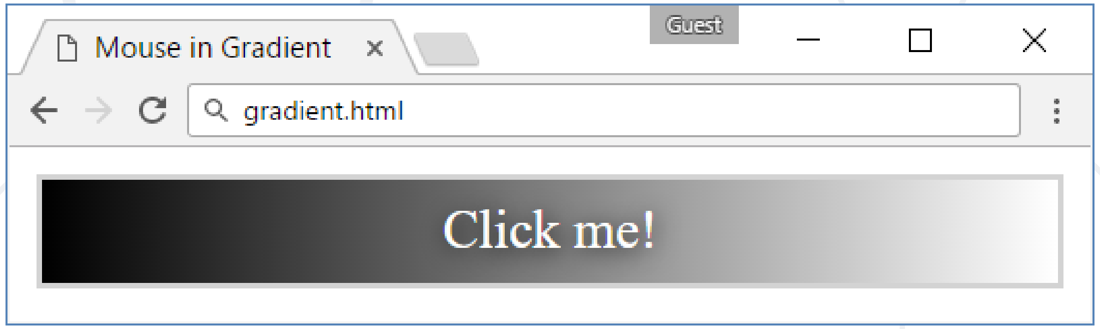
```
<html>
<head>
  <title>Mouse in Gradient</title>
  <link rel="stylesheet" href="gradient.css" />
  <script src="gradient.js"></script>
</head>
<body onload="attachGradientEvents()">
  <div id="gradient-box">
    <div id="gradient">Click me!</div>
  </div>
  <div id="result"></div>
</body>
</html>
```



Problem: Mouse in Gradient – CSS

```css
#gradient-box {
  width: 300px;
  border: 2px solid lightgrey;
}
#gradient-box:hover {
  border: 2px solid black;
}
#gradient {
  height: 30px;
  color: white;
  text-shadow:
    1px 1px 10px black;
```

```css
  text-align: center;
  line-height: 30px;
  background:
    linear-gradient(
    to right, black, white);
  cursor: crosshair;
}
```



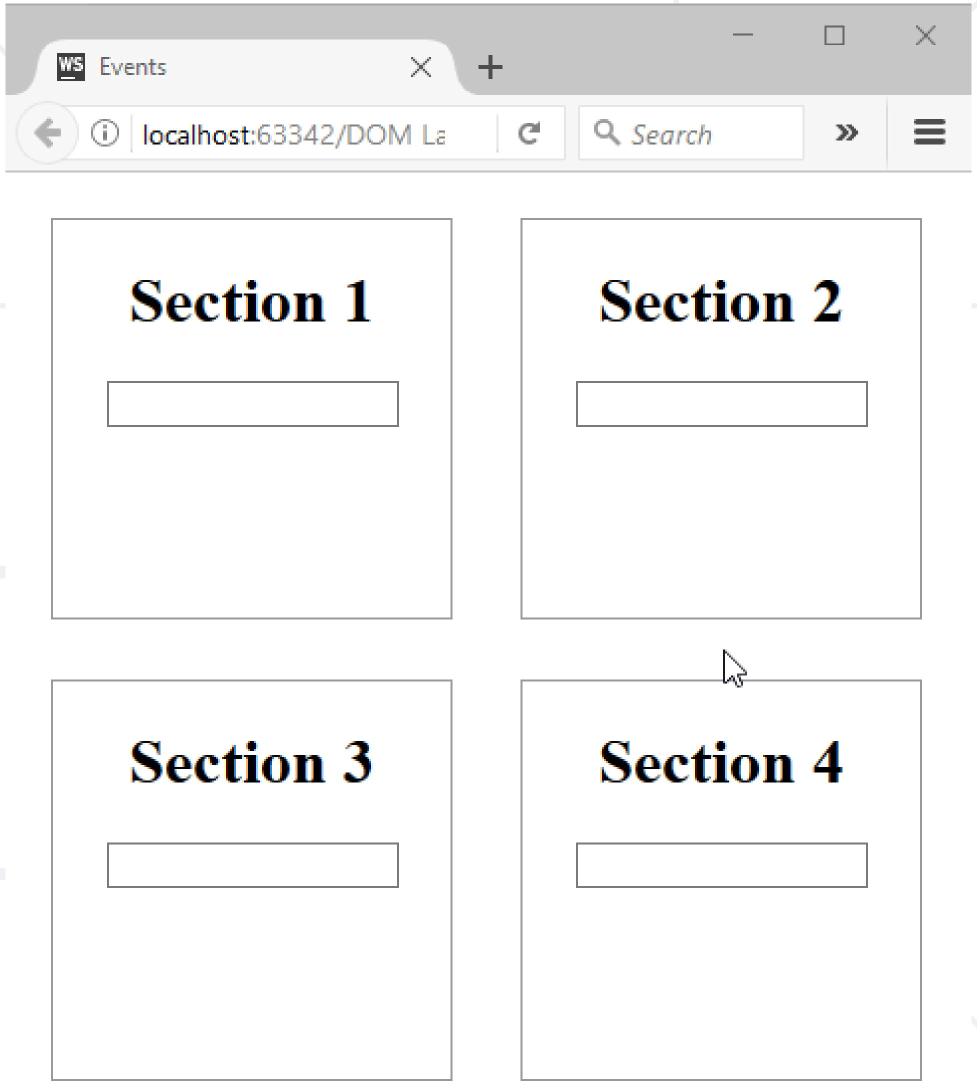
Solution: Mouse in Gradient

```
function attachGradientEvents() {
  let gradient = document.getElementById('gradient');
  gradient.addEventListener('mousemove', gradientMove);
  gradient.addEventListener('mouseout', gradientOut);

  function gradientMove(event) {
    let power = event.offsetX / (event.target.clientWidth - 1);
    power = Math.trunc(power * 100);
    document.getElementById('result').textContent = power + "%";
  }

  function gradientOut(event) {
    document.getElementById('result').textContent = "";
  }
};
```

Check your solution here: https://judge.softuni.bg/Contests/328

Problem: Highlight Active

- A webpage contains **multiple** input boxes inside divs
- Apply styling to the div that holds the **focused** input box
  - Set class "**focus**" for active
  - **Remove** class **attribute** from inactive



Problem: Highlight Active (2)

```html
<!DOCTYPE html><html lang="en">
<head>
  <meta charset="UTF-8"><title>Focus</title>
  <link rel="stylesheet" href="focus.css" />
  <script src="focus.js"></script>
</head>
<body onload="focus()">
  <div>
    <div><h1>Section 1</h1><input type="text"/></div>
    <div><h1>Section 2</h1><input type="text"/></div>
    <div><h1>Section 3</h1><input type="text"/></div>
    <div><h1>Section 4</h1><input type="text"/></div>
  </div>
</body>
</html>
```

Problem: Highlight Active (3)

- Place all project files in the **same folder**
- Listen for **focus** and **blur** events

focus.js

```
function focus() {
  // TODO
}
```

focus.css

```
div {
  width: 470px;
}
div div {
  text-align: center;
  display: inline-block;
  width: 200px;
  height: 200px;
  margin: 15px;
  border: 1px solid #999;
}
.focused {
  background: #999999;
}
```

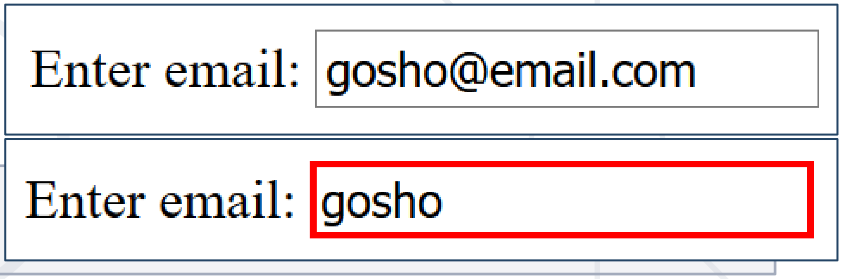
Solution: Highlight Active

```
function focus() {
  let inputs = document.getElementsByTagName('input');
  Array.from(inputs).forEach(i => {
    i.addEventListener('focus', (event) => {
      event.target.parentNode.className = 'focused';
    });
    i.addEventListener('blur', (event) => {
      event.target.parentNode.removeAttribute('class');
    });
  });
}
```

Problem: Dynamic Validation

SoftUni Foundation

- A webpage contains a single email **input** field
- Display **real-time feedback** for user's input
- Valid input format: **<name>@<domain>.<extension>**
  - Only lowercase Latin letters are allowed for **all parts**
- Apply class "**error**" when input is **invalid**



Enter email: gosho@email.com

Enter email: gosho

```
.error { border: 2px solid red; }
```

```
<label for="email">Enter email:</label>
<input id="email" type="text"/>
```

Solution: Dynamic Validation

```
function validate() {
  document.querySelector('input')
    .addEventListener('change', onChange);
  let regex = /^([\w\-.]+)@([a-z]+)(\.[a-z]+)+$/;

  function onChange(event) {
    if (!regex.test(event.target.value))
      event.target.className = 'error';
    else
      event.target.removeAttribute('class');
  }
}
```

Practice: DOM and Events

Live Exercises in Class (Lab)

Summary

- Modifying DOM elements:

```
let menu = document.getElementById('menu');
menu.style.display = 'none';
menu.appendChild(
  document.createElement('hr'));
let link = menu.children[0];
menu.removeChild(link);
```

- Handling events:

```
let menu = document.getElementById('menu');
menu.onclick = function(event) { … }
```

Questions?

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SoftUni Digital

SoftUni Foundation

SoftUni Kids

SoftUni Diamond Partners

SoftUni Foundation

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SBTech
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telenor

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