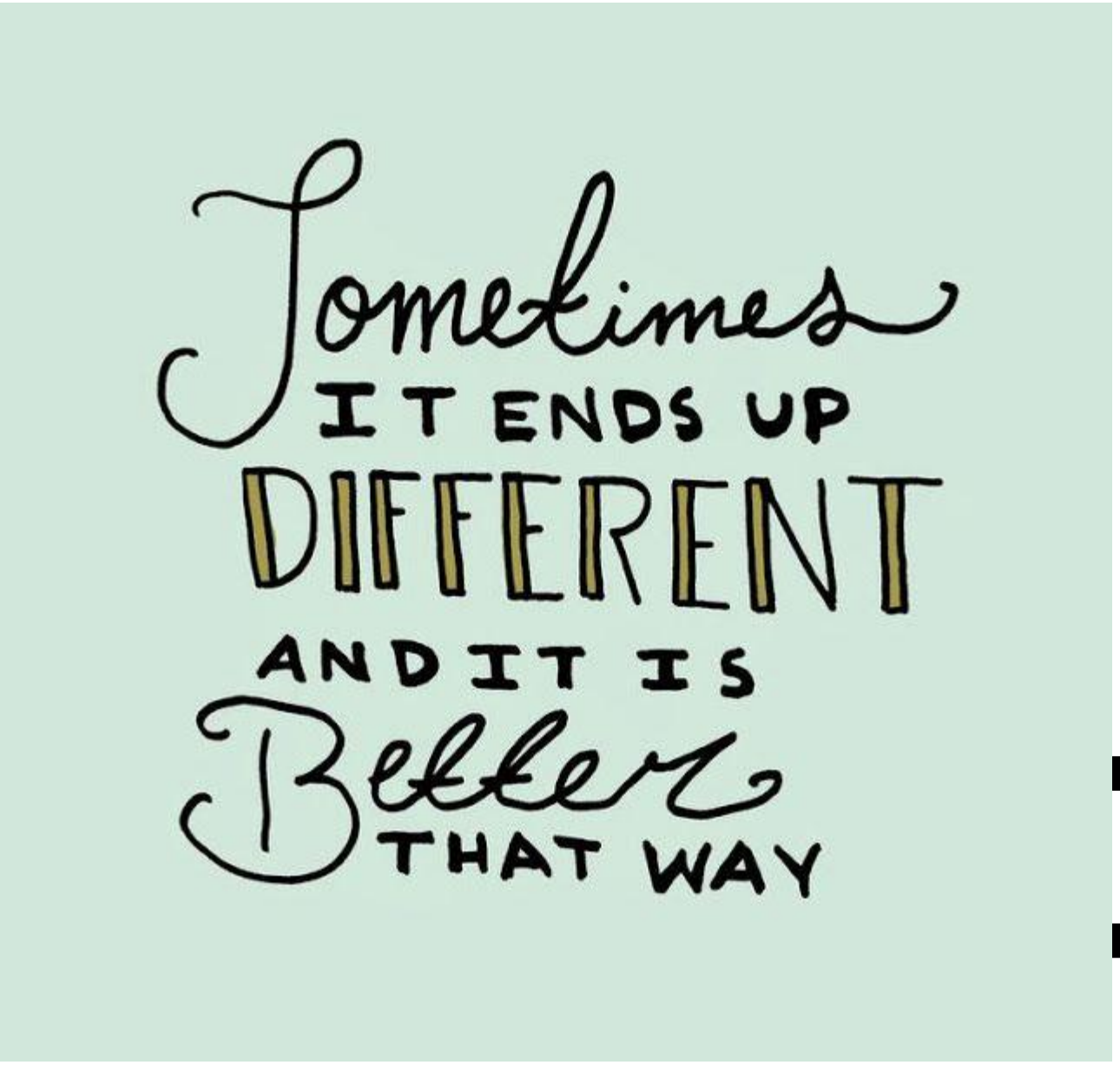
Human Computer Interaction

Week 9: Bootstrap, jQuery, Leaflet

by Henrik Lange

September 2020



Plan

→ Week 1: Setting The Stage
→ Week 2: Mapping, Personas and Journeys
→ Week 3: Sketching
→ Week 4: Decisions and Storyboards
→ Week 5: Prototyping
→ Week 6: Prototype Testing
→ Week 7: Graphic Design
→ Week 8: Building Modern UI (CSS)
→ **Week 9: Building Modern UI (Bootstrap, jQuery & Leaflet)**
→ Week 10: Accessibility and
→ Week 11: Usability Te
→ Week 12: Building Modern UI

Detailed Plan for rest of semester

Tuesday Nov. 16th	Tuesday Nov. 23th	Tuesday Nov. 29th	Tuesday Dec. 6th	Tuesday Dec. 14th
Week 8 Lecture 8+9	Week 9 Lecture 10+11	Week 10 Instructor Class	Week 11 Instructor Class	Week 11 Recorded Lecture 12
Lecture: Live in classroom *8-12*	Lecture: Live in classroom *8-12*	Lecture: No Lecture	Lecture: No Lecture	Lecture: *Recorded* *Available Tuesday Morning*
Exercises: No exercise class	Exercises: No exercise class	Exercises: Instructor class *8-12*	Exercises: Instructor class *8-12*	Exercises: None

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Portfolio Hand-in
Dec. 13th

Agenda

→ Bootstrap

→ jQuery

→ Leaflet

→ Exercises

This Week: Bootstrap, jQuery & Leaflet

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Bootstrap

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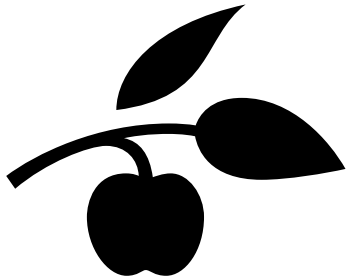

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Bootstrap getting started

→ 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**.

Bootstrap getting started

- → Responsive
- → Mobile-first
- → Front-end
- → HTML and CSS
- → jQuery.

Bootstrap getting started

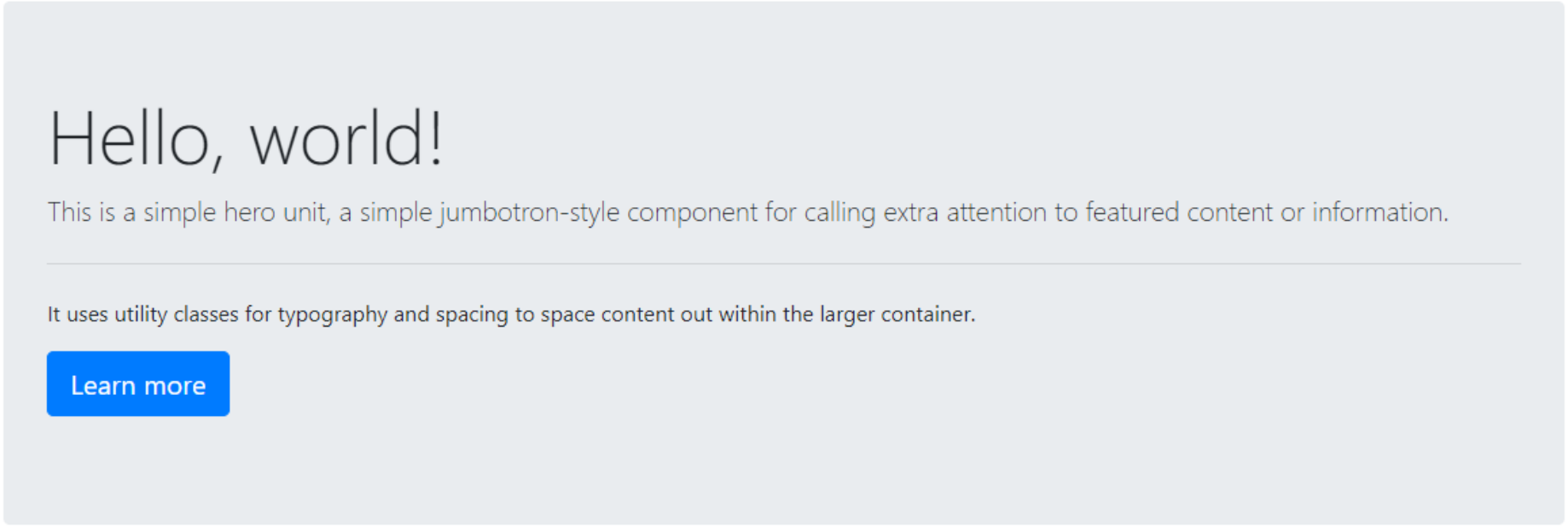
- In the HTML head:
  - CSS
- In the bottom of the body
  - JavaScript

```
<link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/bootstrap.min.css" integrity="sha384-BVYiiSIFeK1dGmJRAkycuHAHRg32OmUcww7on3RYdg4Va+PmSTsz/K68vbdEjh4u" crossorigin="anonymous">

<script src="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/js/bootstrap.min.js" integrity="sha384-Tc5IQib027qvyjSMfHjOMaLkfuWVxZxUPnCJA7l2mCWNIpG9mGCD8wGNIcPD7Txa" crossorigin="anonymous"></script>
```

- Or download it and include it like any other CSS & JavaScript
  - https://getbootstrap.com/docs/4.3/getting-started/introduction/

Jumbotron




```
<div class="jumbotron">
  <h1 class="display-4">Hello, world!</h1>
  <p class="lead">This is a simple hero unit, a simple jumbotron-style component for calling extra attention to featured content or information.</p>
  <hr class="my-4">
  <p>It uses utility classes for typography and spacing to space content out within the larger container.</p>
  <p class="lead">
    <a class="btn btn-primary btn-lg" href="#" role="button">Learn more</a>
  </p>
</div>
```

Tables

#	First	Last	Handle
1	Mark	Otto	@mdo
2	Jacob	Thornton	@fat
3	Larry	the Bird	@twitter

Copy

```
<table class="table">
  <thead>
    <tr>
      <th scope="col">#</th>
      <th scope="col">First</th>
      <th scope="col">Last</th>
      <th scope="col">Handle</th>
    </tr>
  </thead>
  <tbody>
    <tr>
      <th scope="row">1</th>
      <td>Mark</td>
      <td>Otto</td>
      <td>@mdo</td>
    </tr>
    <tr>
      <th scope="row">2</th>
      <td>Jacob</td>
      <td>Thornton</td>
      <td>@fat</td>
    </tr>
    <tr>
      <th scope="row">3</th>
      <td>Larry</td>
      <td>the Bird</td>
```

Tables

Striped rows

Use `.table-striped` to add zebra-striping to any table row within the `<tbody>`.

#	First	Last	Handle
1	Mark	Otto	@mdo
2	Jacob	Thornton	@fat
3	Larry	the Bird	@twitter

```
<table class="table table-striped">
  <thead>
    <tr>
      <th scope="col">#</th>
      <th scope="col">First</th>
```

Copy

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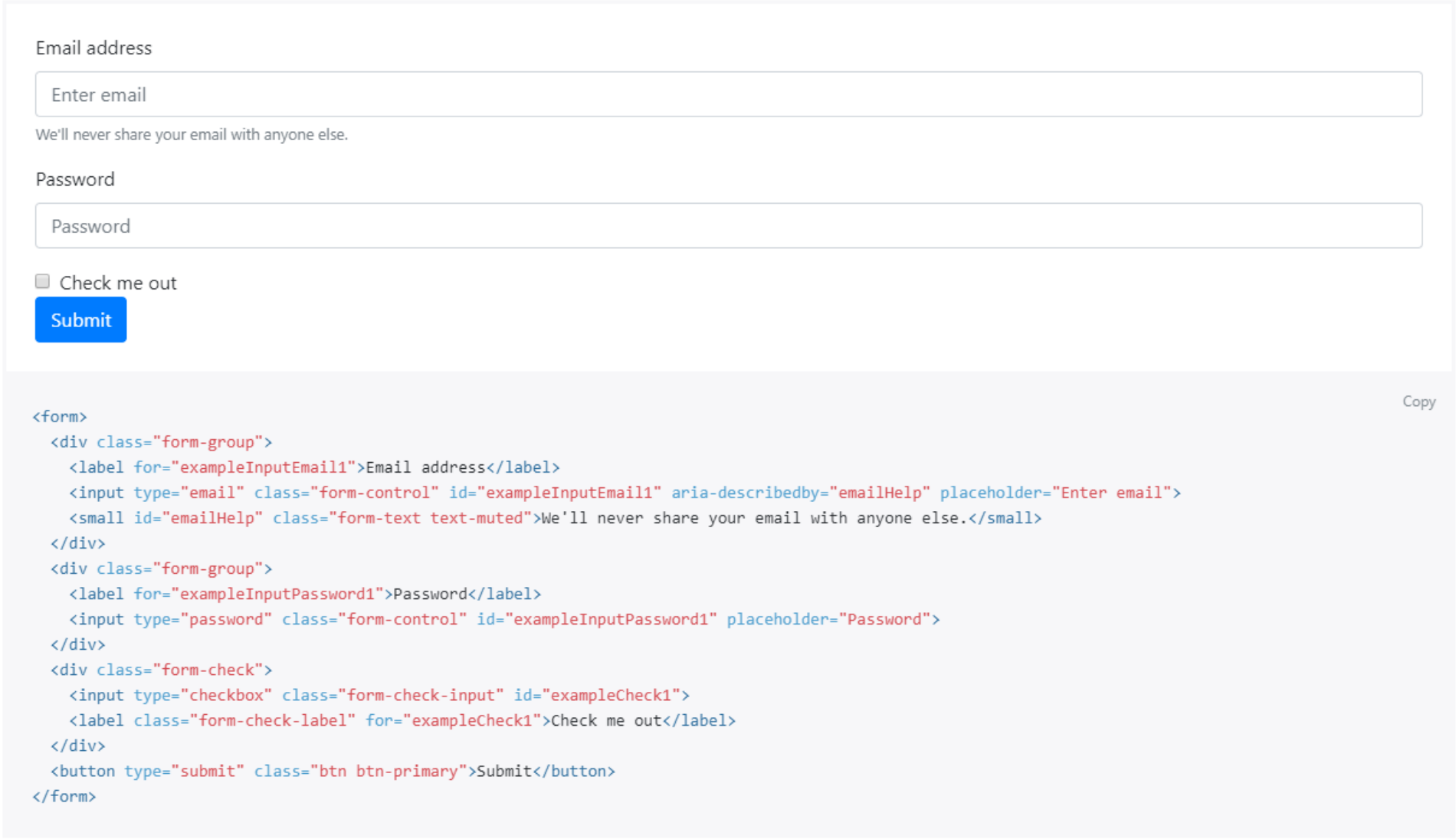
Forms


Email address
Enter email
We'll never share your email with anyone else.
Password
Password
Check me out
Submit
Copy
<form>

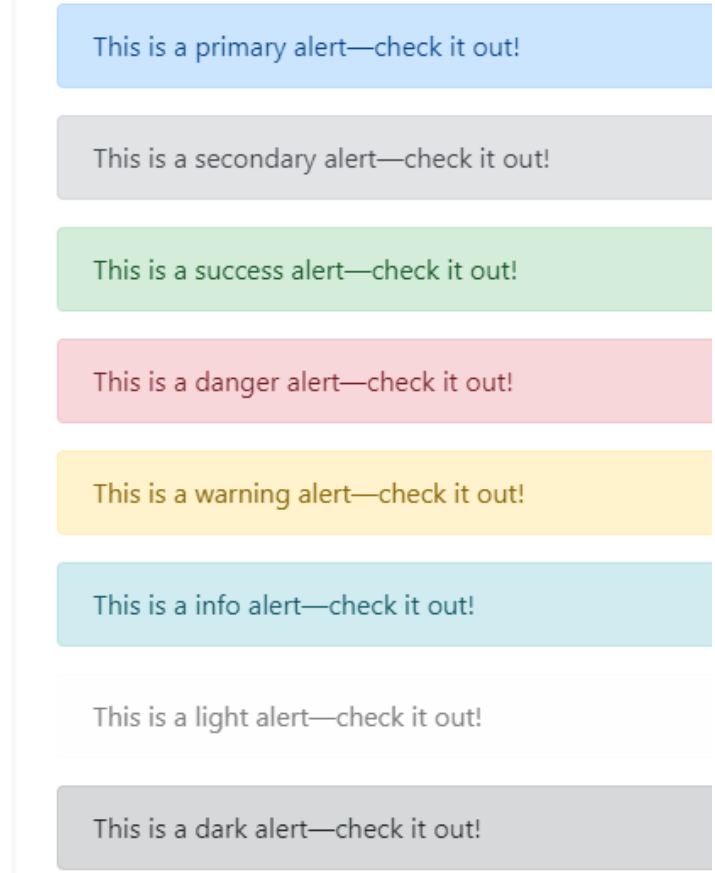
<label for="exampleInputEmail1">Email address</label>
<input type="email" class="form-control" id="exampleInputEmail1" aria-describedby="emailHelp" placeholder="Enter email">
<small id="emailHelp" class="form-text text-muted">We'll never share your email with anyone else.</small>

<label for="exampleInputPassword1">Password</label>
<input type="password" class="form-control" id="exampleInputPassword1" placeholder="Password">

<input type="checkbox" class="form-check-input" id="exampleCheck1">
<label class="form-check-label" for="exampleCheck1">Check me out</label>

<button type="submit" class="btn btn-primary">Submit</button>
</form>

Alerts



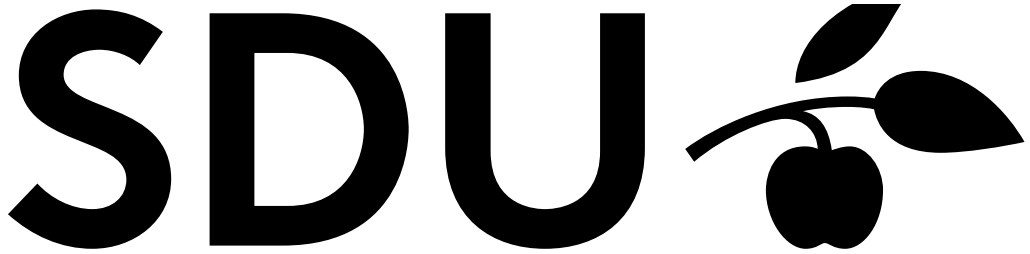

```
<div class="alert alert-primary" role="alert">
  This is a primary alert—check it out!
</div>
<div class="alert alert-secondary" role="alert">
  This is a secondary alert—check it out!
</div>
<div class="alert alert-success" role="alert">
  This is a success alert—check it out!
</div>
<div class="alert alert-danger" role="alert">
  This is a danger alert—check it out!
```

Alerts

Holy guacamole! You should check in on some of those fields below. ×

Copy

```
<div class="alert alert-warning alert-dismissible fade show" role="alert">
  <strong>Holy guacamole!</strong> You should check in on some of those fields below.
  <button type="button" class="close" data-dismiss="alert" aria-label="Close">
    <span aria-hidden="true">&times;</span>
  </button>
</div>
```

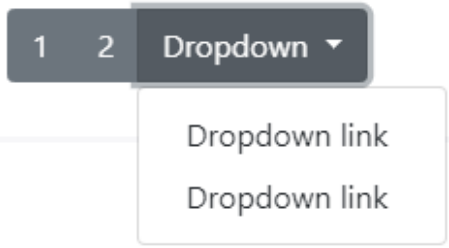


Buttons

```
<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>
```

Button-groups

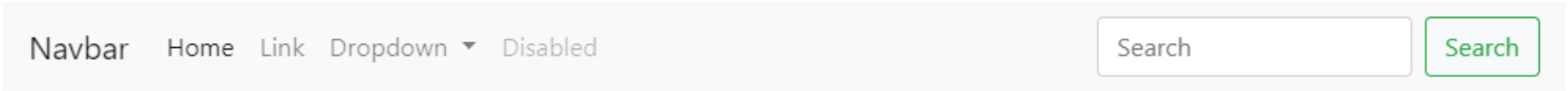


Copy

```
<div class="btn-group" role="group" aria-label="Button group with nested dropdown">
  <button type="button" class="btn btn-secondary">1</button>
  <button type="button" class="btn btn-secondary">2</button>

  <div class="btn-group" role="group">
    <button id="btnGroupDrop1" type="button" class="btn btn-secondary dropdown-toggle" data-toggle="dropdown" aria-haspop
      Dropdown
    </button>
    <div class="dropdown-menu" aria-labelledby="btnGroupDrop1">
      <a class="dropdown-item" href="#">Dropdown link</a>
      <a class="dropdown-item" href="#">Dropdown link</a>
    </div>
  </div>
</div>
```

Navbar responsive

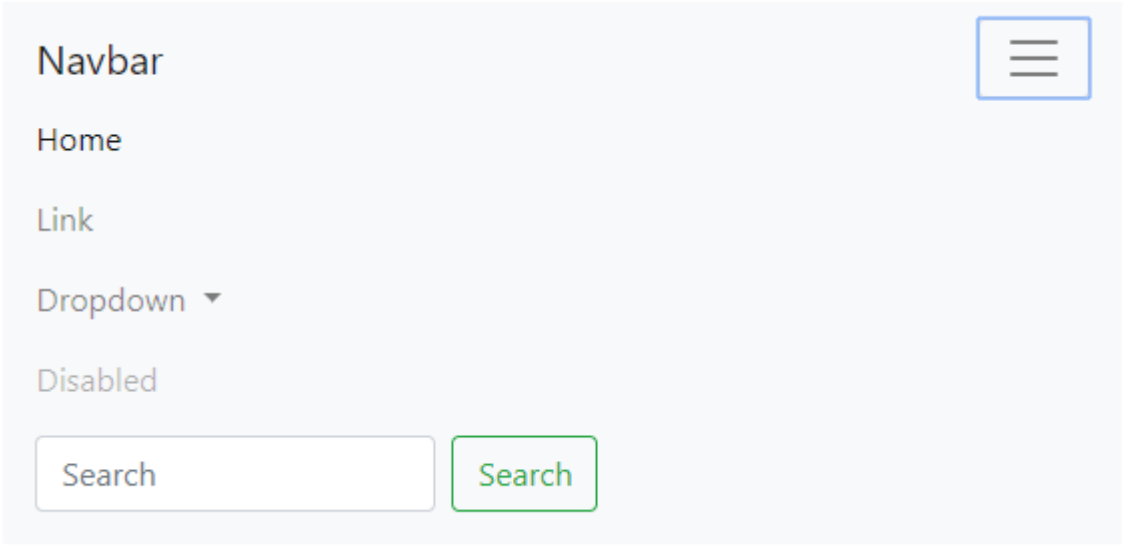


Copy

```
<nav class="navbar navbar-expand-lg navbar-light bg-light">
  <a class="navbar-brand" href="#">Navbar</a>
  <button class="navbar-toggler" type="button" data-toggle="collapse" data-target="#navbarSupportedContent" aria-controls="navbars
    <span class="navbar-toggler-icon"></span>
  </button>

  <div class="collapse navbar-collapse" id="navbarSupportedContent">
    <ul class="navbar-nav mr-auto">
      <li class="nav-item active">
        <a class="nav-link" href="#">Home <span class="sr-only">(current)</span></a>
      </li>
      <li class="nav-item">
        <a class="nav-link" href="#">Link</a>
      </li>
      <li class="nav-item dropdown">
        <a class="nav-link dropdown-toggle" href="#" id="navbarDropdown" role="button" data-toggle="dropdown" aria-haspopup="true'
          Dropdown
        </a>
        <div class="dropdown-menu" aria-labelledby="navbarDropdown">
          <a class="dropdown-item" href="#">Action</a>
          <a class="dropdown-item" href="#">Another action</a>
          <div class="dropdown-divider"></div>
          <a class="dropdown-item" href="#">Something else here</a>
        </div>
      </li>
      <li class="nav-item">
        <a class="nav-link disabled" href="#">Disabled</a>
      </li>
    </ul>
    <form class="form-inline my-2 my-lg-0">
      <input class="form-control mr-sm-2" type="search" placeholder="Search" aria-label="Search">
      <button class="btn btn-outline-success my-2 my-sm-0" type="submit">Search</button>
    </form>
  </div>
```

Navbar responsive



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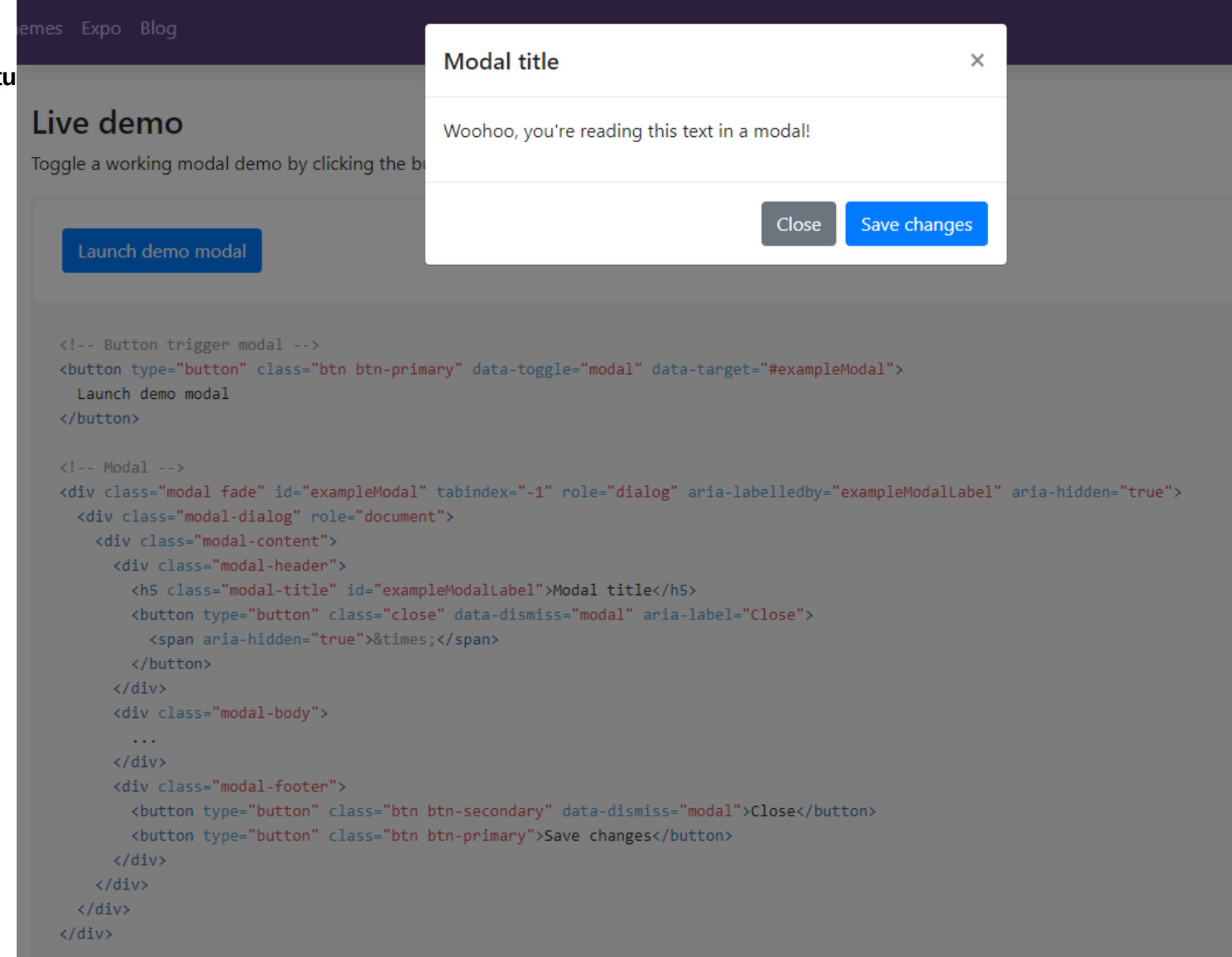
Popover

Click to toggle popover
Popover title
And here's some amazing content. It's very engaging. Right?
Copy
<button type="button" class="btn btn-lg btn-danger" data-toggle="popover" title="Popover title" data-content="And here's some amazing content. It's ver

Modal


emes Expo Blog
Modal title
Woohoo, you're reading this text in a modal!
Close
Save changes
Live demo
Toggle a working modal demo by clicking the b
Launch demo modal
<!-- Button trigger modal -->
<button type="button" class="btn btn-primary" data-toggle="modal" data-target="#exampleModal">
Launch demo modal
</button>
<!-- Modal -->

<h5 class="modal-title" id="exampleModalLabel">Modal title</h5>
<button type="button" class="close" data-dismiss="modal" aria-label="Close">
×
</button>

...

<button type="button" class="btn btn-secondary" data-dismiss="modal">Close</button>
<button type="button" class="btn btn-primary">Save changes</button>

Grid System

One of three columns	One of three columns	One of three columns

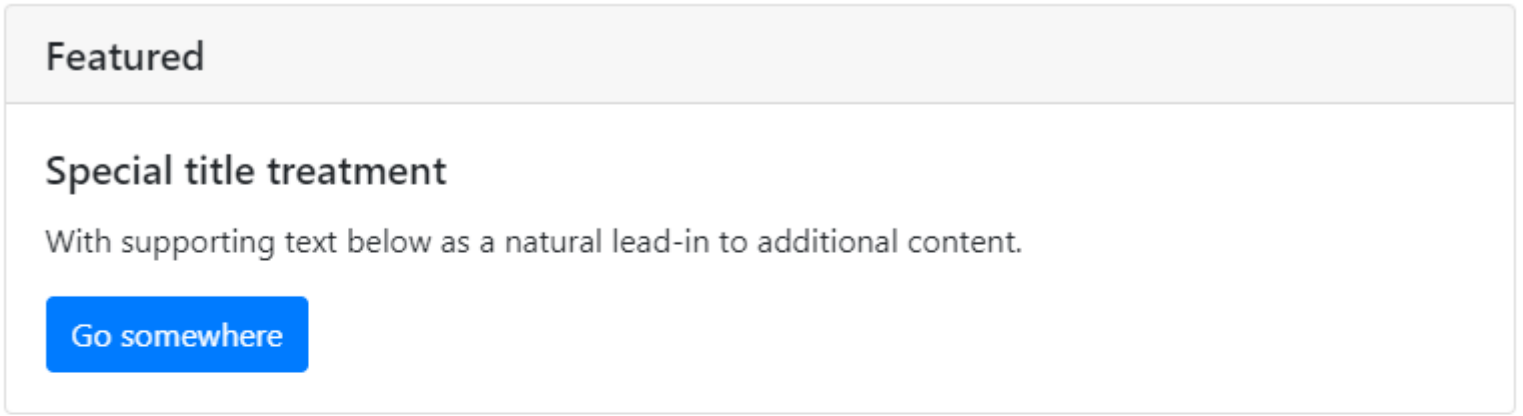
Copy

```
<div class="container">
  <div class="row">
    <div class="col-sm">
      One of three columns
    </div>
    <div class="col-sm">
      One of three columns
    </div>
    <div class="col-sm">
      One of three columns
    </div>
  </div>
</div>
```

Grid System

More: https://uxplanet.org/how-the-bootstrap-4-grid-works-a1b04703a3b7

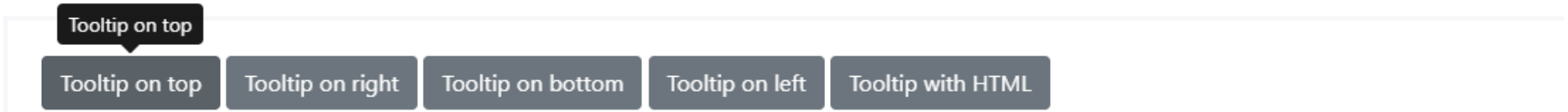
Card / Panel



Copy

```
<div class="card">
  <h5 class="card-header">Featured</h5>
  <div class="card-body">
    <h5 class="card-title">Special title treatment</h5>
    <p class="card-text">With supporting text below as a natural lead-in to additional content.</p>
    <a href="#" class="btn btn-primary">Go somewhere</a>
  </div>
</div>
```

Tooltip




```
<button type="button" class="btn btn-secondary" data-toggle="tooltip" data-placement="top" title="Tooltip on top">
  Tooltip on top
</button>
<button type="button" class="btn btn-secondary" data-toggle="tooltip" data-placement="right" title="Tooltip on right">
  Tooltip on right
</button>
<button type="button" class="btn btn-secondary" data-toggle="tooltip" data-placement="bottom" title="Tooltip on bottom">
  Tooltip on bottom
</button>
<button type="button" class="btn btn-secondary" data-toggle="tooltip" data-placement="left" title="Tooltip on left">
  Tooltip on left
</button>
```

And with custom HTML added:

```
<button type="button" class="btn btn-secondary" data-toggle="tooltip" data-html="true" title="<em>Tooltip</em> <u>with</u> <b>HTML</b>">
  Tooltip with HTML
</button>
```

jQuery
write less, do more.

jQuery.com

"jQuery is a fast, small, and feature-rich **JavaScript** library. It makes things like **HTML document traversal** and **manipulation**, **event** handling, **animation**, and **Ajax** much simpler with an easy-to-use API that works across a multitude of browsers. With a combination of versatility and extensibility, jQuery has changed the way that millions of people write **JavaScript**."

Why jQuery?

- → Used in tons of production systems
  - → Most?
- → Automatically included and used in .net templates
- → Some people can't tell the difference between jQuery and JS
  - → You must be able to!
  - → Just look up any JS problem on stackoverflow, and the replies will be for jQuery

jQuery History

→ Created in 2006
→ To make it easier to write JavaScript
→ To make cross-browser compatibility simpler
→ “Write less, do more”

→ With EcmaScript 6 (EC6), JavaScript is as easy to write as jQuery in almost **all** cases

→ But you WILL run into it
→ Again and again
→ And possibly have to work with it.

$

→ Whenever you see a $ in JavaScript, you should think jQuery
→ jQuery is JUST JavaScript!
→ $ is a legal character in JavaScript
→ jQuery uses $ heavily

Getting Started

→ In your HTML body bottom:

```
<script src="https://ajax.googleapis.com/ajax/libs/jquery/3.3.1/jquery.min.js"></script>
```

→ Or download it and include it like any other JavaScript

→ If you use **Bootstrap**, you most already have it on your site!

Getting Started

→ In your HTML head:

```
<script src="https://ajax.googleapis.com/ajax/libs/jquery/3.3.1/jquery.min.js"></script>
```

→ Or download it and include it like any other JavaScript

→ If you use **Bootstrap**, you most already have it on your site!

On Page Load

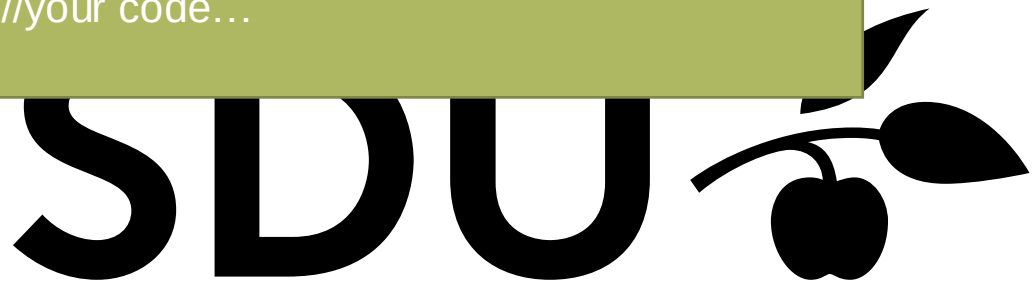
→ Do something when page loads:

jQuery

```
$('document').ready(function() {
 //your code…
});
```

JavaScript

```
document.onload = function () {
  //your code…
}
```



Find DOM element

→ Find DOM element

jQuery	JavaScript
`$('div.menu .selected');`	`document.querySelector('div.menu .selected');`
`$('div.menu .selected') .html('new content');`	`document .querySelector('div.menu .selected') .innerHTML = 'new content';`
`$('div.menu .selected') .css('color', 'red');`	`document .querySelector('div.menu .selected') .style.Color = 'red';`

Experiment

→ We use q instead of $ to avoid confusion

jQuery	JavaScript

	`function q (search) {`
	`  return document.querySelector(search);`
	`}`

`$('div.menu .selected');`	`q('div.menu .selected');`

→ jQuery selectors can go beyond the JS query selector

→ p:contains('specific words')

Find DOM element

→ Find DOM element

jQuery	JavaScript
$(‘div.menu .selected’);	q(‘div.menu .selected’);

→ Change style

$(‘div.menu .selected’) .html(‘new content’);	q(‘div.menu .selected’) .innerHTML = ‘new content’;

→ Change attribute

$(‘div.menu .selected’) .css(‘color’, ‘red’);	q(‘div.menu .selected’) .style.Color = ‘red’;
$(‘img’).attr(‘src’, ‘newImage.png’);	q(‘img’).src = ‘red’;

Add / Remove Class

→ Add Class

jQuery	JavaScript
$(”#whatever”) .addClass(”anotherClass”);	q(”#whatever”) .classList .add(”anotherClass”);

→ Toggle class

$(”#whatever”) .removeClass(”anotherClass”);	q(”#whatever”) .classList .remove(”anotherClass”);
$(”#whatever”) .toggle(”anotherClass”);	q(”#whatever”) .classList .toggle(”anotherClass”);

Add Events

jQuery

```
$(”button.myButton”)
    .click(function() {
        //event
});
```

```
$(”button.myButton”)
    .hover(function() {
        //event
});
```

```
$(”button.myButton”)
    .dblclick(function() {
        //event
});
```

JavaScript

```
q(”button.myButton”)
    .addEventListener(”click”, function() {
        //event
});
```

```
q(”button.myButton”)
    .addEventListener(”hover”, function() {
        //event
});
```

```
q(”button.myButton”)
    .addEventListener(”dblclick”, function() {
        //event
});
```

Find Mouse Position

jQuery

```
$(”button.myButton”)
    .click(function(e) {
        $(‘posX’).val(e.pageX);
        $(‘posX’).val(e.pageY);
});
```

JavaScript

```
q(”button.myButton”)
    .addEventListener(”click”, function(e) {
        var posX = clientX;
        var posY = clientY;
});
```

jQuery

```
$(”button.myButton”)
    .move(function(e) {
        $(‘posX’).val(e.screenX);
        $(‘posX’).val(e.screenY);
});
```

JavaScript

```
q(”button.myButton”)
    .addEventListener(”mousemove”,
function(e) {
        var posX = clientX;
        var posY = clientY;
});
```

Tables

jQuery

```
$("#myTable tr:first")
    .css("background-color", "blue");
$("#myTable tr:even")
    .css("background-color", "white");
$("#myTable tr:odd")
    .css("background-color", "grey");
```

CSS

```
#myTable tr:first-child {
    background-color: white;
}
#myTable tr:nth-child(even) {
    background-color: white;
}
#myTable tr:nth-child(odd) {
    background-color: grey;
}
```

First	Row	Blue
Even	Row	White
Odd	Row	Grey
Even	Row	White
Odd	Row	Grey

AJAX

```
<div>Ajax: <span id=”ajaxContent"></span></div>
```

jQuery

```
$.ajax({
    type: "GET",
    url: "someServerService.php",
    success: function(text) {
        $('#ajaxContent ').text(text);
    },
    error: function(XMLHttpRequest, textStatus,
errorThrown) {
        $('#ajaxContent ').text('Error: ' +
errorThrown);
    }
});
```

JavaScript fetch

```
fetch('someServerService.php')
    .then(function(response) {
        return response.text();
    })
    .then(function(text) {
        q('#ajaxContent').innerHTML = text;
    })
    .catch(function(error) {
        q('#ajaxContent').innerHTML = 'Request failed: ' +
error;
    });
```

JavaScript XMLHttpRequest

```
var xmlhttp = new XMLHttpRequest();
xmlhttp.onreadystatechange = function() {
    if(this.readyState == 4 && this.status == 200) {
        q('#ajaxContent').innerHTML = this.responseText;
    } else {
        q('#ajaxContent').innerHTML = 'Request failed: ' +
this.responseText;
    }
}
xmlhttp.open("GET", "someServerService.php", true);
xmlhttp.send();
```

SDU

September 2020

Leaflet

→ “Leaflet is the leading open-source JavaScript library for mobile-friendly interactive maps”

→ “Leaflet is designed with simplicity, performance and usability in mind. It works efficiently across all major desktop and mobile platforms, can be extended with lots of plugins, has a beautiful, easy to use and well-documented API and a simple, readable source code that is a joy to contribute to.”

https://leafletjs.com/examples/quick-start/

Leaflet – get started

→ Import leaflet in HTML head
  → Remember to set viewport!

```
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<link rel="stylesheet" href="https://unpkg.com/leaflet@1.0.2/dist/leaflet.css">
<script src="https://unpkg.com/leaflet@1.0.2/dist/leaflet.js"></script>
```

```
<div id="map" style="width: 700px; height: 400px;"></div>
```

https://leafletjs.com/examples/quick-start/

Leaflet – get started

→ Set centrum coordinates in JavaScript

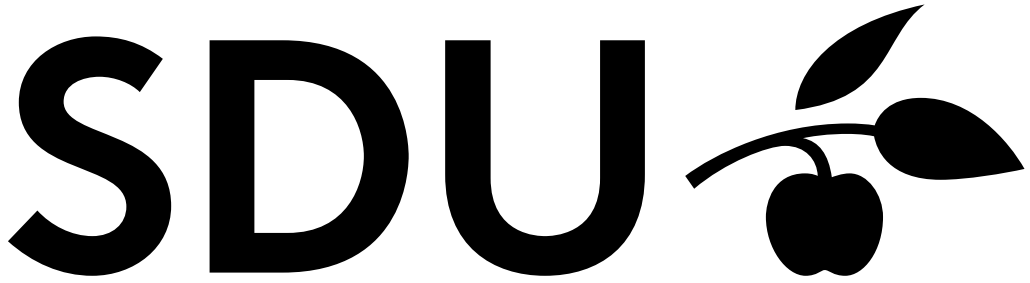
```
var map = L.map('map').setView([56.255,  10.08], 12);
```

→ Set a tile layer

```
L.tileLayer('http://{s}.tile.osm.org/{z}/{x}/{y}.png',  {
    attribution:  '&copy; <a href="http://osm.org/copyright">OpenStreetMap</a>
contributors'
}).addTo(map);
```

→ You now have a live map!

→ Scrolling and zooming is enabled by default



https://leafletjs.com/examples/quick-start/

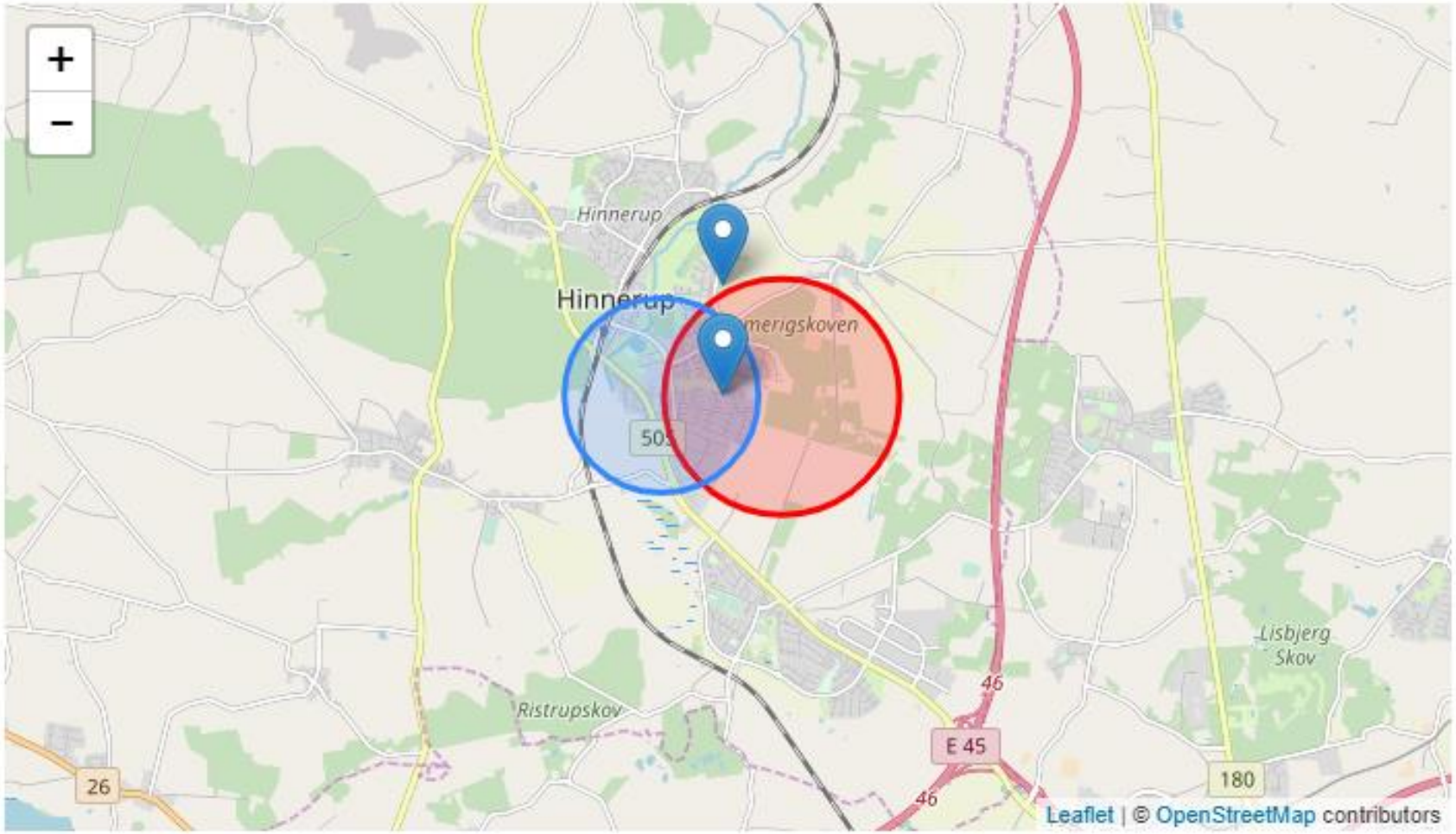
Leaflet – get started

→ Add circles and markers with optional popups

→ Popups support rich HTML

```
L.circle([56.2568605075,  10.0888809242], 1200, {color: "red"})
    .bindPopup('Popup for <span style="color: #f00;">red</span> circle.')
    .addTo(map);

L.circle([56.2569805095,  10.0688809249], 1000).addTo(map);

L.marker([56.2569805095,  10.0788809249]).addTo(map)
    .bindPopup('Popup for <span style="color: #00f;">blue</span> marker')
    .openPopup();

L.marker([56.2669805095,  10.0788809249]).addTo(map)
    .openPopup();
```

Leaflet – get started



Google Charts

Google Charts

→ Import in HTML Body Bottom

```
<script type="text/javascript"  src="https://www.gstatic.com/charts/loader.js"></script>
```

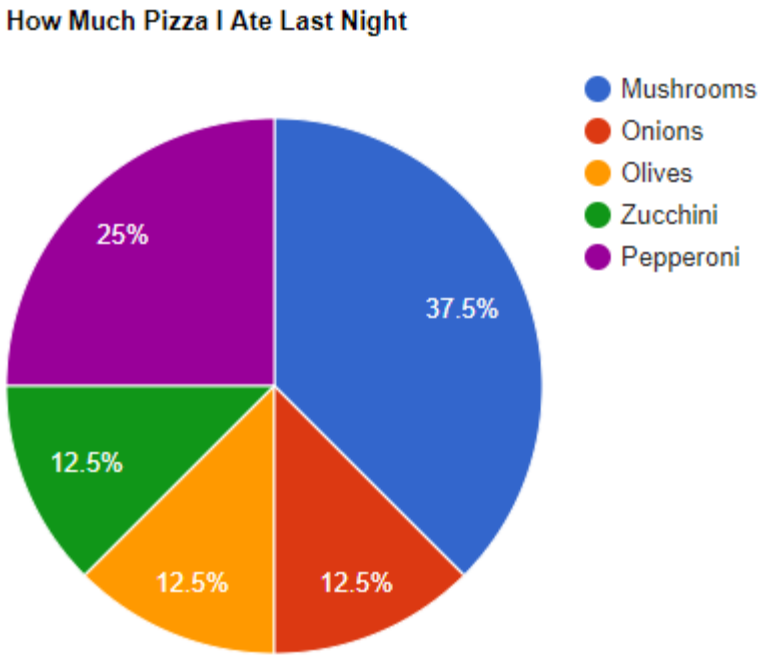
→ Make placeholder div in HTML body

```
<div id="chart_div"></div>
```

→ We can now use the charts to populate the div in various ways

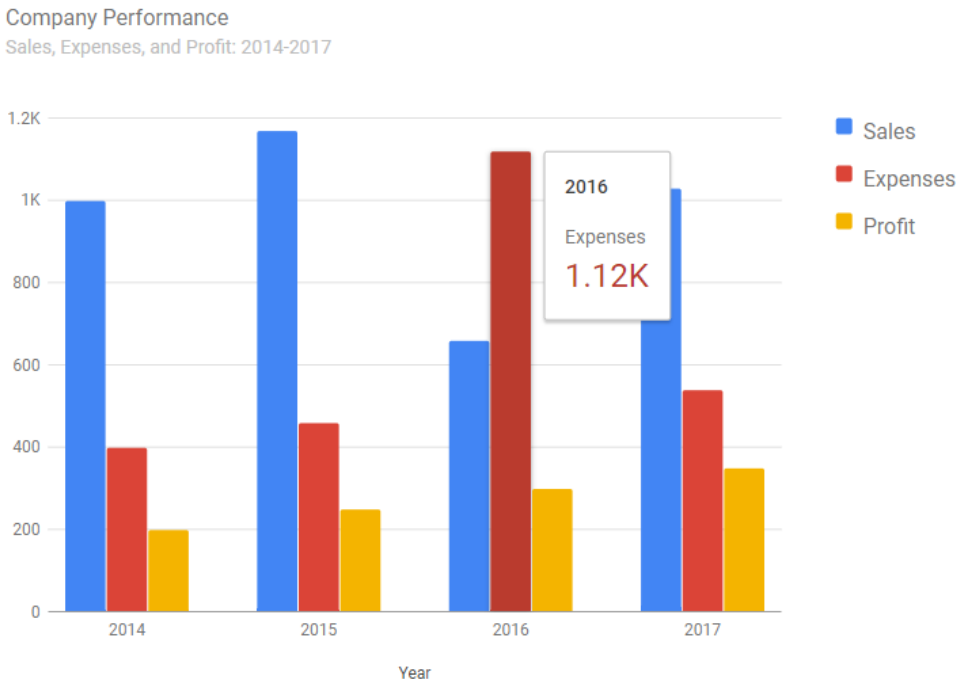
→ https://developers.google.com/chart/interactive/docs/gallery

Google Charts



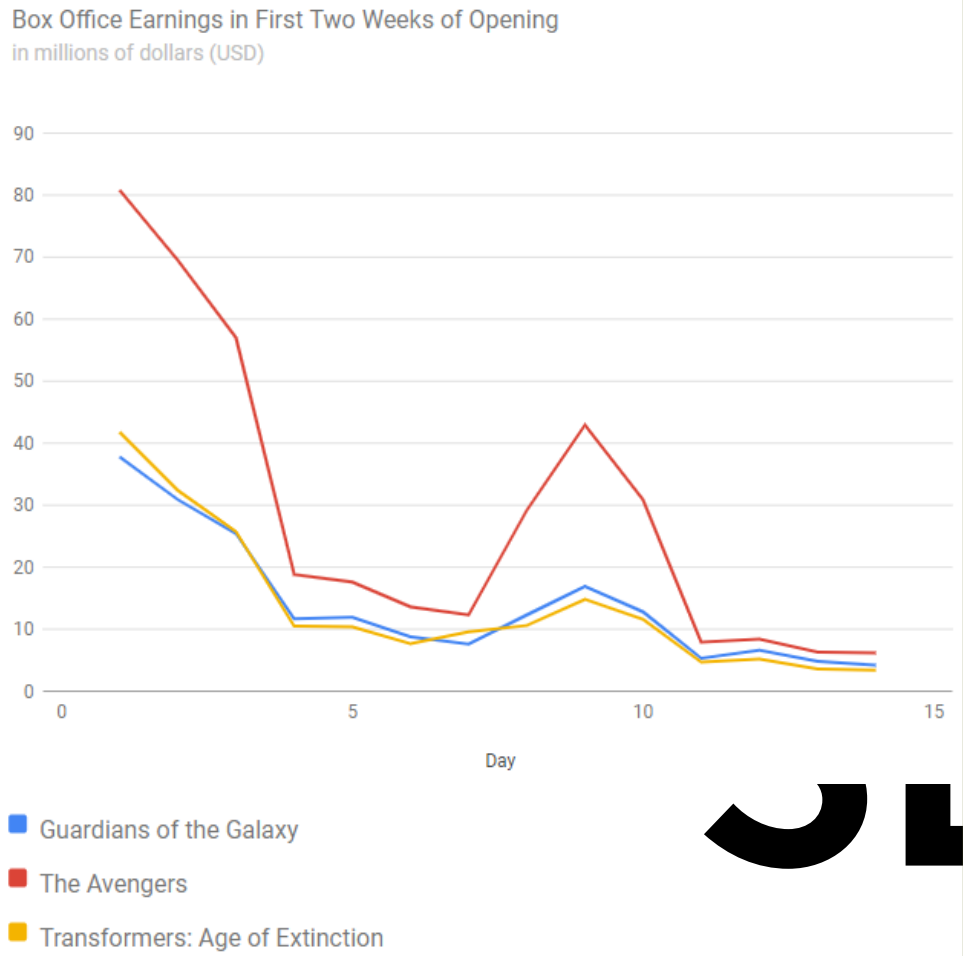

```
google.charts.load('current',
{'packages':['corechart']});
google.charts.setOnLoadCallback(drawChart);

function drawChart() {

    var data = new google.visualization.DataTable();
    data.addColumn('string', 'Topping');
    data.addColumn('number', 'Slices');
    data.addRows([
        ['Mushrooms', 3],
        ['Onions', 1],
        ['Olives', 1],
        ['Zucchini', 1],
        ['Pepperoni', 2]
    ]);

    var options = {'title':'How Much Pizza I Ate Last
Night',
                   'width':700,
                   'height':500};

    var chart = new
google.visualization.PieChart(document.getElementB
yId('chart_div'));
    chart.draw(data, options);
}
```

Google Charts




```
google.charts.load('current', {'packages':['bar']});
google.charts.setOnLoadCallback(drawChart);

function drawChart() {
    var data = google.visualization.arrayToDataTable([
          ['Year', 'Sales', 'Expenses', 'Profit'],
          ['2014', 1000, 400, 200],
          ['2015', 1170, 460, 250],
          ['2016', 660, 1120, 300],
          ['2017', 1030, 540, 350]
        ]);

        var options = {
            'width':700,
            'height':500,
            title: 'Company Performance',
            subtitle: 'Sales, Expenses, and Profit: 2014-
2017',
        };

        var chart = new
google.charts.Bar(document.getElementById('chart_
div'));
        chart.draw(data, google
            .charts.Bar.convertOptions(options));
}
```

Google Charts



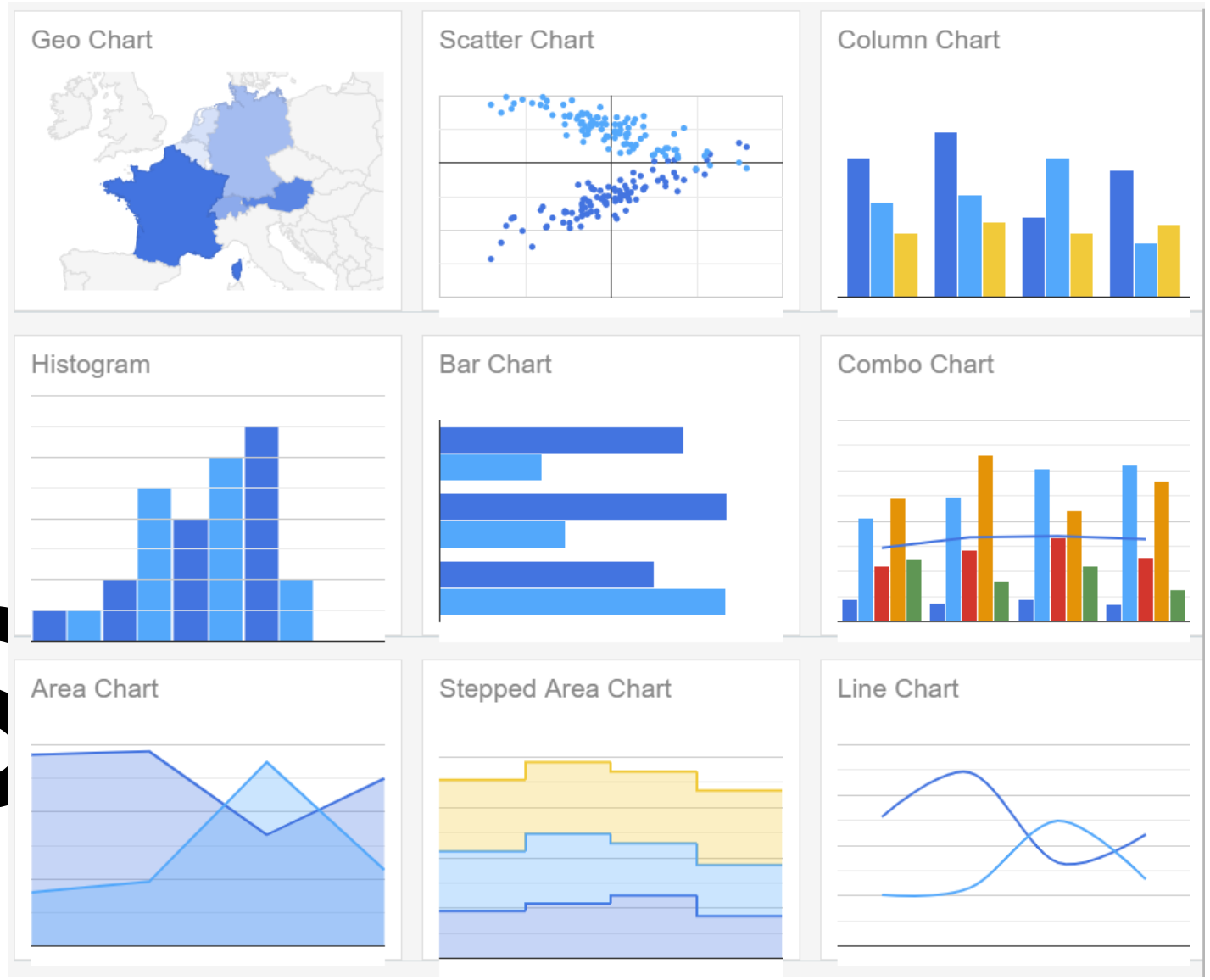

```
google.charts.load('current', {'packages':['line']});
google.charts.setOnLoadCallback(drawChart);

function drawChart() {
      var data = new google.visualization.DataTable();
      data.addColumn('number', 'Day');
      data.addColumn('number', 'Guardians of the
Galaxy');
      data.addColumn('number', 'The Avengers');
      data.addColumn('number', 'Transformer: AOE');

      data.addRows([
        [1, 37.8, 80.8, 41.8],
        …
        [14, 4.2, 6.2, 3.4]
      ]);

      var options = {
        title: 'Box Office in First Two Weeks',
        subtitle: 'in millions of dollars (USD)',
        width: 900,
        height: 500
      };

      var chart = new
google.charts.Line(document.getElementById('chart_div'
));
      chart.draw(data,
google.charts.Line.convertOptions(options));
}
```

Google Charts

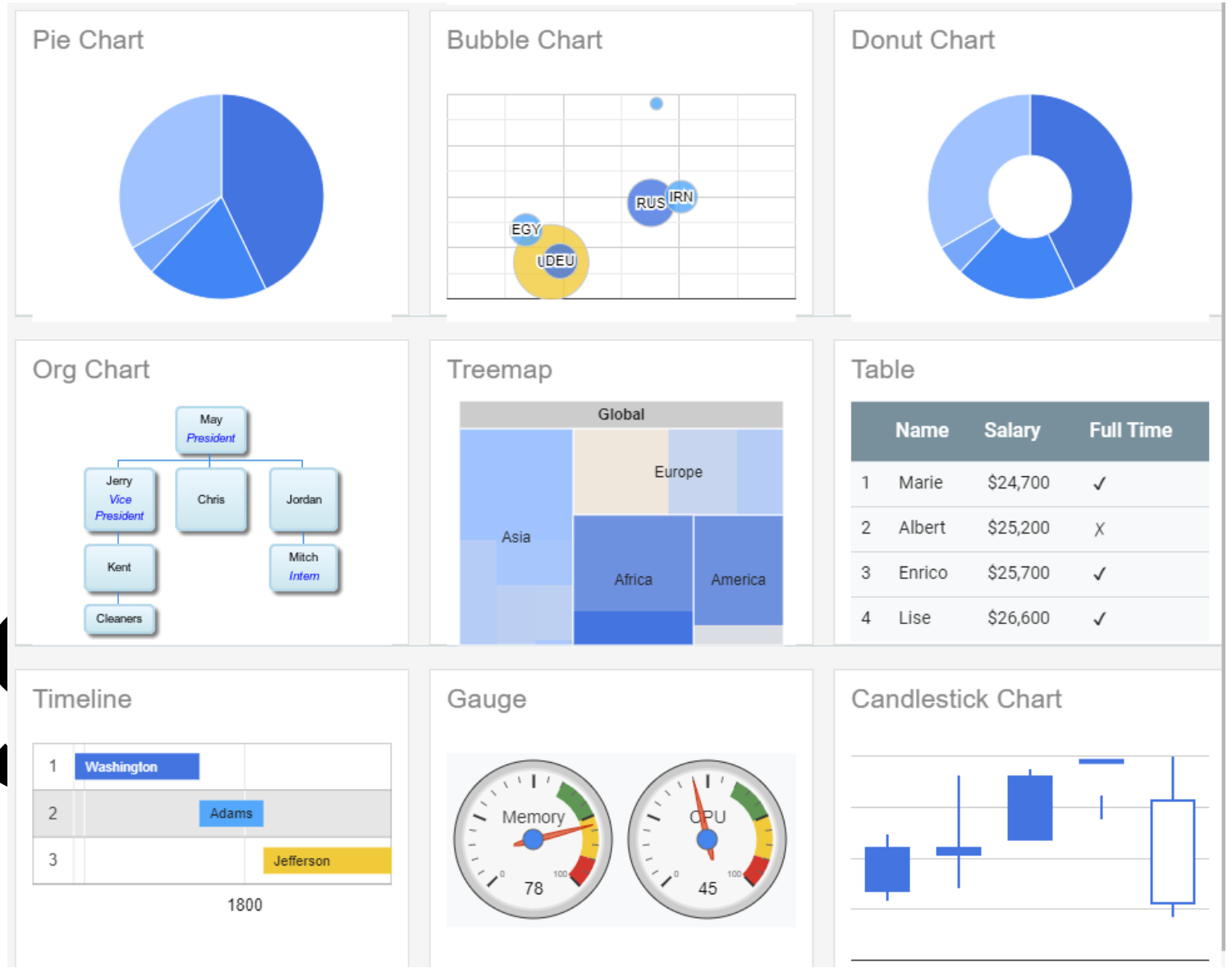
You can always hover over the data to see more specific info

Code samples for all of them that you can copy and modify

Google Chart Options



Google Chart Options



Google Chart Options

https://developers.google.com/chart/interactive/docs/gallery

Exercises: Use Frameworks

SDU

September 2020

- → Use Bootstrap, jQuery, Leaflet and Google Charts
- → **Only put the frameworks in your project that it needs!**
- → Play around with all of them, but don't put them all in your project

- → Bootstraps menu system and grid system makes sense in most projects
- → Many of you had maps in your project – built that with Leaflet
- → If you need to show data charts, use Google Charts

- → What attendance should we expect in tomorrows instructor sessions?

You are now ALLOWED to use Bootstrap, jQuery, Leaflet and Google Charts

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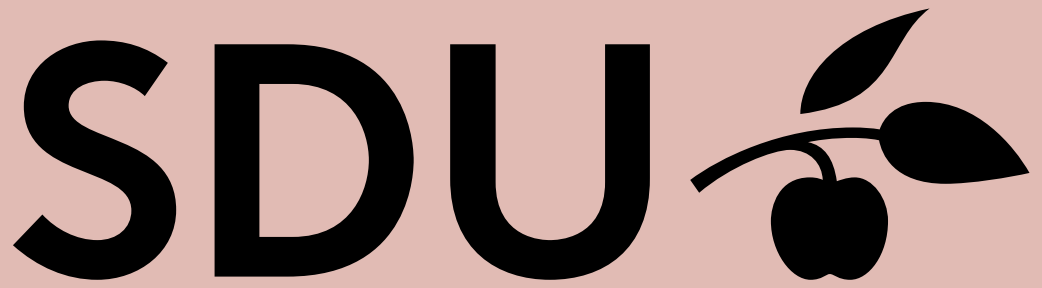
Next Lecture: Modern UI

September 2020

→ Modern UI

Next lecture



September 2020