

# Responsive Web Tables

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## Abstract

Responsive techniques are techniques used in web design which enable better rendering of web pages, tables, and other elements. With better rendering, it is meant as a rescaling of the resolution of the device used to open the specific website. When using responsive techniques, it doesn't matter which device is used to look at a website, the website should look good.

It is mostly a combination of fluid grids, which enables the elements of a page to be sized in relative units, such as percentages, rather than using pixels or points, flexible images, same thing as in fluid grids, media queries, which enable using many CSS tricks or style rules and responsive layout which can automatically adapt, resize, and adjust to any device screen size, be it a laptop, mobile phone or tablet.

Responsive tables are tables which use the approach mentioned above, which allow them to be more flexible and complex, without compromising its usability while adding a better aesthetically pleasing look. In this survey report, we will provide a good overview of what responsive techniques, responsive tables, and good table designs are, and, finally, recommend the best technique combination, in our opinion, to use.



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# Chapter 1

## Introduction

Going back, at the starting point of web development, its creators and designers have not had the need to think about the look and design of the page, because back then, their users and clients would mostly access the site via the same device, that being a personal desktop computer which would mostly share the same resolution and display size. That means that they mostly needed to design and work around the same concept. Also, they didn't need to think about things like what if an user entered the site with this device or this, so they could basically use static and fixed positioning of elements.

However, today's technologies, be it the mobile industry or technical industry in general, the devices have come a long way, and are being worked on really fast. What does that mean is that the programmers and designers need to consider that people will have different ways of using and browsing their pages, which require different approaches to design their web pages. Nowadays, the clients and users have a broad list of devices, which they can use to access a web page, be it a tablet, mobile phone, laptop and even TVs [ITU.int 2015].

Basically, the most important thing is to make the web pages' user interface as friendly as possible, so that the user does not lose much time navigating around. And with that being said, web programmers need to automatically think about making the web pages in that way, while they are being accessed from those different devices mentioned [Wikimedia Commons 2011].

Responsive Web Design is an approach, or more rather a technique, which is used to construct a self-adapting web page, meaning that it adapts, resizes, shrink and changes its' form in any way needed to perfectly fit the web-accessing device used to visit it [Sharki and Fisher 2013].

### 1.1 How to achieve Responsive Web Design

If a programmer wants his web site to be responsive, he has to use following techniques:

- Media queries
- Flexible images and media
- Fluid grid layouts

### 1.2 Media queries

Media queries are very important because with them it is possible to specify with what device the web page is being accessed. The query usually is made of a media type, and some conditions which can check if the media type has some special property [Himanshu Negi 2018].

Basically it allows defining specific CSS rules, depending on the device used.

```

1      % An example of a media query, where one can say that for a screen of size 850px
      or less, the background is black:
2
3      @media screen and (max-width: 600px) {
4      body {
5          background-color: olive;
6      }
7      }

```

From this example above, with the help of the parameter *screen* the media type was specified and using *max-width* the condition was determined which affects the device of the user. Now, there are many different conditions which can be used, and they are really helpful, because with them it is possible to adjust display settings for every device there is.

For example, if the user is entering the website with his phone, it can be automatically said that an image should have a lower resolution, thus adjusting it better for his screen and saving some bandwidth.

Another example would be using *display:none* with which some content can completely be hidden that should not be displayed.

```

1      % An example of using display: none:
2
3      <!DOCTYPE html>
4      <html>
5      <head>
6      <style>
7      h1.none {
8          display: none;
9      }
10     </style>
11     </head>
12     <body>
13
14     <h1 class="none">This will not be displayed</h1>
15
16     </body>
17     </html>

```

If this was ran in the browser, header would not be seen, because it was decided to not be shown. If *display:none* was changed to *display:block* our header would be visible.

Include a list of *all* the relevant papers and resources you have found and mark those you have chosen to focus on. Make sure *all* the papers and resources you found or were given appear in the bibliography.

## 1.3 Fluid Grid Layouts

Normally, websites are constructed in a layout which is grid-built, because they are easier to handle in different kind of devices. Also what is specific for that kind of layout is that it is built using divs, HTML tables and so on. Now, on top of that responsive web design comes in play[MOHAMED 2015]. With it, it is possible to use percentage-based element sizing which is easier than using pixels.

According by (Abdulrehman,2015) a flexible grid-layout is one of the foundations of responsive design. Using the term "grid" does not mean necessarily that a grid framework needs to be used. What it means is that specific CSS tricks are used for positioning. Also, he suggest that using pixels for the measurement unit should be stopped, because pixels can vary.



For example, on one device they can be one point or dot, on another device it can be a few more, and therefore unreliable. So, what needs to be done is that, if pixels are used, they should be converted using a formula stated by (Marcotte, 2010) in Dan Cederholm's book named "Handcrafted CSS":

$$Target \div Context = Result \quad (1.1)$$

It is asserted by (Pettit, 2012) that, to use this formula, the context of the element needs to be divided by the target element.

## 1.4 Flexible images and media

With this approach, any type of media, images depending on the screen resolution will resize, collapse, crop and adjust accordingly to it, and to achieve this it is possible to use the same thing mentioned in the previous section, relative units, if the screen becomes too small then hide the image completely or by cropping some parts of the image, again in the case if the screen becomes too small [Frain 2015].

### 1.4.1 Relative measurements

Instead of using pixels, relative dimensions can be used, percentage based. So instead of specifying the view and dimensions in pixels, one can specify for example 60%, which would result in resizing or reshinking of the image based on the resolution of the device accordingly to fill 60% of the page.



**Figure 1.1:** Relative Image Dimensions. [Taken from research paper.]

### 1.4.2 Cropping

Another option is cropping, which crops the picture to a certain width with the help of CSS.



(a) Picture with original size



(b) Picture when cropped

**Figure 1.2:** Image cropping. [<https://alligator.io/css/cropping-images-object-fit/>.]

In this Figure above, it can be obviously seen that the result of tweaking the image a bit. With just a few CSS commands, it is possible to crop the picture and if someone is browsing the web site with a smaller device, the image does not have to be hidden, just its' size is changed.

```

1      % An example of a media query, where one can say that for a screen of size 850px
      or less, the background is black:
2
3      figure{
4          width:300px; /*container-width*/
5          overflow:hidden; /*hide bounds of image */
6          margin:0;    /*reset margin of figure tag*/
7      }
8      figure img{
9          display:block; /*remove inline-block spaces*/
10         width:100%; /*make image stretch*/
11     }

```

Taken from [<https://medium.com/@elad/how-to-crop-images-with-css-b8471d402b16>.]

## Chapter 2

# HTML Tables

In case of having too much data to display, or data which is inherently better in a grid, HTML tables are the best solution available. Before, tables have been used mostly for the layout of HTML websites (and is now an example of bad website development practices) mainly due to two reasons:

- Semantically, it is wrong.
- Tables aren't as adaptable and flexible as divs'

### 2.1 Structure of Tables

The basic structure of an HTML table starts with the `<table>` tag. It is the starting point for constructing a table. Now, HTML tables consist of columns and rows, like normal tables. For rows, the tag `<tr>` is used, whereas for table header `<th>` tag is used. Normally, table headers are positioned in the center and are bold. For table cells `<td>` tag is used [HTML5 Tutorial no date].

```

1      % An example of an HTML Table which demonstrates information about cars:
2      <!DOCTYPE html>
3      <html>
4      <head>
5          <title>Best Cars 2019</title>
6      </head>
7      <body>
8          <table class="table table-bordered table-hover table-condensed">
9              <thead>
10                 <tr>
11                     <th title="Field #1">Car</th>
12                     <th title="Field #2">Manufacturer</th>
13                     <th title="Field #3">Engine Size</th>
14                     <th title="Field #4">Cylinders</th>
15                     <th title="Field #5">Horsepower</th>
16                     <th title="Field #6">Torque</th>
17                     <th title="Field #7">Compresion Ratio</th>
18                     <th title="Field #8">Miles per gallon</th>
19                     <th title="Field #9">Price</th>
20                 </tr>
21             </thead>
22             <tbody>
23                 <tr>
24                     <td>2019 Acura RDX</td>
25                     <td>Acura</td>
26                     <td>2.00L</td>
27                     <td align="right">4</td>
28                     <td align="right">272</td>
29                     <td align="right">280</td>
30                     <td>9.8:1</td>
31                     <td align="right">28</td>
32                     <td>€33,600.00</td>
33                 </tr>
34                 <tr>
35                     <td>2019 Ford Ranger</td>
36                     <td>Ford</td>
37                     <td>2.30L</td>
38                     <td align="right">4</td>
39                     <td align="right">270</td>
40                     <td align="right">310</td>
41                     <td>10.0:1</td>
42                     <td align="right">21</td>
43                     <td>€21,800.00</td>
44                 </tr>
45             </tbody>
46         </table>
47     </body>
48 </html>

```

Now, there exist more tags which can be used for HTML5 tables:

- <thead> - Table header, it is used to point out single or multiple rows of a table, which do not contain table data but column labels [Adam Wood no date].
- <tbody> - Table body, it is used to point out <tr> elements. Position this tag always after <thead>, but it can also come after or before <tfoot> [Adam Wood no date].
- <tfoot> - Table footer, it is used to point out single or multiple <tr> elements where those elements are presenting an overview of the data in the table [Adam Wood no date].
- <caption> - Table caption, as the name already says, can be used to specify table caption. Can be put on the bottom of the CSS document.

- `<col>` - While using `col` and some other keyword, for example, `align`, it is possible direct the alignment of text in the table. There are other keywords whom can be used to adjust colors, width and many other things of table columns.

## Chapter 3

# Good Table Design

We will discuss certain conventions that are widely regarded as “Good Table Design”. These conventions are generally neat little CSS tricks which serve to aesthetically improve the look of a table and in most cases also add to the effectiveness and efficiency of tables. All tables must incorporate at least one of the following conventions.

### 3.1 Alternate row highlighting

When presented a table with a lot of entries, it can be hard to look at. Scrolling through numerous rows can be frustrating. With this CSS trick, it can be a bit easier, at least for the eyes, if nothing else. The idea is to color every even row, while leaving the odd ones intact. Implementing this technique requires only two lines of CSS, and is objectively useful.

```
1  % An example of using simple CSS to color table rows:
2
3  table.alt tr:nth-child(even) {background: #CCC}
4  table.alt tr:nth-child(odd) {background: #FFF}
```

An example HTML table with this technique is shown below.

Car	Manufacturer	Engine Size(L)	Cylinders	Horsepower	Torque	Compresion Ratio	Miles per gallon	Price(€)
2019 Acura RDX	Acura	2.0	4	272	280	9.8:1	28	33,600.00
2019 Ford Ranger	Ford	2.3	4	270	310	10.0:1	21	21,800.00
2019 Genesis G70	Genesis	2.0	4	252	260	10.0:1	22	31,300.00
2019 GMC Sierra 1500	GMC	4.0	6	285	305	11.0:1	16	26,600.00
2019 Honda Passport	Honda	3.5	6	280	262	11.5:1	21	28,700.00
2019 Jaguar I-Pace	Jaguar	0.0	0	394	513	0.0:1	0	62,400.00
2020 Mercedes-Benz GLE 450	Mercedes-Benz	3.0	4	362	369	10.5:1	22	54,900.00
2019 Nissan Altima	Nissan	2.5	4	188	180	8.0:1	32	21,500.00
2019 Ram 1500	Ram	5.7	8	395	410	11.3:1	23	28,600.00

**Figure 3.1:**  
[Screenshot taken by the author.]

## 3.2 Current Row Highlighting

Just like in Alternate Row Highlighting, ‘walking’ through a big table one may easily become lost and wouldn’t know in which row he is at the moment, which can be pretty stressful and overall decrease the efficiency of the table.

With the help of some CSS, the lives of the users are made easier.

```

1      % An example of using simple CSS to highlight table rows:
2
3      table {
4          overflow: hidden;
5      }
6
7      tr:hover {
8          background-color: #ffa;
9      }
10
11     td, th {
12         position: relative;
13     }
14     td:hover::after,
15     th:hover::after {
16         content: "";
17         position: absolute;
18         background-color: #ffa;
19         left: 0;
20         width: 100%;
21         z-index: -1;
22     }

```

An example HTML table with this technique is shown below.

Car	Manufacturer	Engine Size(L)	Cylinders	Horsepower	Torque	Compression Ratio	Miles per gallon	Price(€)
2019 Acura RDX	Acura	2.0	4	272	280	9.8:1	28	33,600.00
2019 Ford Ranger	Ford	2.3	4	270	310	10.0:1	21	21,800.00
2019 Genesis G70	Genesis	2.0	4	252	260	10.0:1	22	31,300.00
2019 GMC Sierra 1500	GMC	4.0	6	285	305	11.0:1	16	26,600.00

**Figure 3.2:**

[Screenshot taken by the author.]

## 3.3 Expandable Areas

Should we have any further information available about a table’s object, making the row clickable and showing the extra information is a better alternative than trying to cram everything inside the table. In the following code snippet we see how additional data in an HTML table can be implemented. [Alligator.io LLC 2019]

```

1  <tr>
2      <td>2019 Acura RDX</td>
3      <td>Acura</td>
4      <td style="text-align: right">2.0</td>
5      <td style="text-align: right">4</td>
6      <td style="text-align: right">272</td>
7      <td style="text-align: right">280</td>
8      <td style="text-align: right">9.8:1</td>
9      <td style="text-align: right">28</td>
10     <td style="text-align: right">33,600.00</td>

```

```

11     </tr>
12     <tr>
13         <td colspan="5">
14             <h4>Additional information about the car</h4>
15
16             <ul>
17                 <li><a href="https://en.wikipedia.org/wiki/Acura_RDX">Acura RDX</a>
18                 </li>
19                 <li><a href="https://www.acura.ca/rdx">Acura RDX official webpage</a>
20                 </li>
21             </ul>
22         </td>
23     </tr>
24 </tr>

```

To implement this table feature the combination of JavaScript and CSS needs to be implemented. In the snippet code below, the JavaScript and CSS code can be reviewed.

```

1 <script type="text/javascript">
2 $(document).ready(function(){
3
4     $("#report tr:odd").addClass("odd");
5     $("#report tr:not(.odd)").hide();
6     $("#report tr:first-child").show();
7
8     $("#report tr.odd").click(function () {
9         var trToToggle = $(this).next("tr");
10        $("#report tr:not(.odd)").not(trToToggle).hide();
11        $("#report tr:first-child").show();
12        $(trToToggle).toggle();
13        $(this).find(".arrow").toggleClass("up");
14    });
15 })
16 </script>

```



```
1 #report {
2     border-collapse:collapse;
3 }
4 #report h4 {
5     margin:0px;
6     padding:0px;
7 }
8 #report img {
9     float:right;
10 }
11 #report ul {
12     margin:10px 0 10px 40px;
13     padding:0px;
14 }
15 #report th {
16     background:#7CB8E2 repeat-x scroll center left;
17     color:#fff;
18     padding:7px 15px;
19     text-align:left;
20 }
21 #report td {
22     background:#C7DDEE none repeat-x scroll center left;
23     color:#000;
24     padding:7px 15px;
25 }
26 #report tr.odd td {
27     cursor:pointer;
28 }
29 #report div.arrow {
30     background:transparent url(arrows.png) no-repeat scroll 0px -16px;
31     width:16px;
32     height:16px;
33     display:block;
34 }
35 #report div.up {
36     background-position:0px 0px;
37 }
```

An example HTML table with this technique before a row is clicked is shown below.

### Expandable Areas

Car	Manufacturer	Engine Size(L)	Cylinders	Horsepower	Torque	Compression Ratio	Miles per gallon	Price(€)
2019 Acura RDX	Acura	2.0	4	272	280	9.8:1	28	33,600.00
2019 Genesis G70	Genesis	2.0	4	252	260	10.0:1	22	31,300.00
2019 Honda Passport	Honda	3.5	6	280	262	11.5:1	21	28,700.00
2020 Mercedes-Benz GLE 450	Mercedes-Benz	3.0	4	362	369	10.5:1	22	54,900.00
2019 Ram 1500	Ram	5.7	8	395	410	11.3:1	23	28,600.00
2019 Toyota Rav4	Toyota	2.5	4	219	184	13.0:1	39	22,900.00
2019 Ford Ranger	Ford	2.3	4	270	310	10.0:1	21	21,800.00

**Figure 3.3:**  
[Screenshot taken by the author.]

An example HTML table with this technique after a row is clicked is shown below.

### Expandable Areas

Car	Manufacturer	Engine Size(L)	Cylinders	Horsepower	Torque	Compression Ratio	Miles per gallon	Price(€)
2019 Acura RDX	Acura	2.0	4	272	280	9.8:1	28	33,600.00
<b>Additional information about the car</b> <ul style="list-style-type: none"> <li><a href="#">Acura RDX</a></li> <li><a href="#">Acura RDX official webpage</a></li> </ul>								
2019 Genesis G70	Genesis	2.0	4	252	260	10.0:1	22	31,300.00
2019 Honda Passport	Honda	3.5	6	280	262	11.5:1	21	28,700.00
2020 Mercedes-Benz GLE 450	Mercedes-Benz	3.0	4	362	369	10.5:1	22	54,900.00

**Figure 3.4:**  
[Screenshot taken by the author.]

## 3.4 Pagination (With Sort and Search)

The amount of data increases every second, over 2.5 quintillion bytes of data are made every day and there is also estimation that in 2020 will be created 1.7MB of data in every second for each person in the world[Irfan Ahmad 2018]. Tables are one of the best mediums for displaying large sets of data efficiently. Features can be added to tables to increase efficiency even more. For example, if a table is too long, it can be divided into 'pages'. Each page houses a certain amount of rows. The user then can 'flip' through these pages as page navigation is also implemented.

Furthermore, it is possible to sort the table by column (in ascending/descending and alphabetical order), and search for an element in the table.

This solution works for following browsers:

- Google Chrome
- Mozilla Firefox
- Internet Explorer
- Opera
- Microsoft Edge

For the implementation plug-in for the jQuery Javascript library called DataTables is used[ no date].

```

1  % An example of using Javascript plugin DataTable():
2  %Include these two files in order to include additional advanced features
   to any HTML table
3  %cdn.datatables.net/1.10.20/css/jquery.dataTables.min.css
4  %cdn.datatables.net/1.10.20/js/jquery.dataTables.min.js
5
6  $(document).ready(function(){
7      $('#myTable').dataTable(); //this plugin provides searching, sorting
   and pagination
8  });

```

Table is initialized with "myTable" id and this id is used in ready function() to assign dataTable functionality to our HTML table instance[Brian Tompsett 2018].

An example HTML table with this technique when using the sort feature on the Price column is shown below.

Show  entries

Search:

Car	Manufacturer	Engine Size(L)	Cylinders	Horsepower	Torque	Compresion Ratio	Miles per gallon	Price(€)
2019 Nissan Altima	Nissan	2.5	4	188	180	8.0:1	32	21,500.00
2019 Ford Ranger	Ford	2.3	4	270	310	10.0:1	21	21,800.00
2019 Toyota Rav4	Toyota	2.5	4	219	184	13.0:1	39	22,900.00
2019 GMC Sierra 1500	GMC	4.0	6	285	305	11.0:1	16	26,600.00
2019 Ram 1500	Ram	5.7	8	395	410	11.3:1	23	28,600.00
2019 Honda Passport	Honda	3.5	6	280	262	11.5:1	21	28,700.00
2019 Subaru Ascent	Subaru	2.4	4	260	277	10.6:1	22	28,700.00
2019 Volvo XC40	Volvo	2.0	4	248	258	10.8:1	26	30,300.00
2019 Genesis G70	Genesis	2.0	4	252	260	10.0:1	22	31,300.00
2019 Acura RDX	Acura	2.0	4	272	280	9.8:1	28	33,600.00

Showing 1 to 10 of 12 entries

Previous  2 Next

**Figure 3.5:**  
[Screenshot taken by the author.]

An example HTML table with this technique when using the search feature is shown below.

Show  entries

Search:

Car	Manufacturer	Engine Size(L)	Cylinders	Horsepower	Torque	Compresion Ratio	Miles per gallon	Price(€)
2019 Acura RDX	Acura	2.0	4	272	280	9.8:1	28	33,600.00

Showing 1 to 1 of 1 entries (filtered from 12 total entries)

Previous  Next

**Figure 3.6:**  
[Screenshot taken by the author.]

## Chapter 4

# Responsive Tables

Due to the increasing amount of screens and their varying shapes, sizes, and developers' space allocation when designing and implementing tables, responsive table techniques have been 'developed' by manipulating the table's columns and rows to provide an optimal experience for users across most mediums. It means the row and columns can be repositioned, resized, collapsed, minimized, etc..

Data tables can contain many information, which makes displaying that data quite messy and hard to look at. So by using responsive design, a big favor is done to the clients, by adjusting the table according to their devices. One idea would be to minimize the table, but if the user is looking at the table from his mobile device, he would have to zoom in, which is not that useful to him, because then again he would need to scroll to view the whole table [Chris Coyier 2018].

## BOTH EQUALLY SUCK



**Figure 4.1:**

[<https://css-tricks.com/responsive-data-tables/>.]

As seen in the figure above, both options do not really look nor perform well. So, by using some simple CSS it is possible to fix that problem. With the help of the mentioned media queries, it is possible to specify for which device sizes, which settings should be used.

```

1      % An example of using simple CSS with media queries on how to achieve
      Responsive Design:
2
3      @media
4  only screen and (max-width: 760px),
5  (min-device-width: 768px) and (max-device-width: 1024px) {
6
7      /* Force table to not be like tables anymore */
8      table, thead, tbody, th, td, tr {
9          display: block;
10     }
11
12     /* Hide table headers (but not display: none;, for accessibility) */
13     thead tr {
14         position: absolute;
15         top: -624.9375rem;
16         left: -624.9375rem;
17     }
18
19     tr { border: 1px solid #ccc; }
20
21     td {
22         /* Behave like a "row" */
23         border: none;
24         border-bottom: 1px solid #eee;
25         position: relative;
26         padding-left: 50%;
27     }
28
29     td:before {
30         /* Now like a table header */
31         position: absolute;
32         /* Top/left values mimic padding */
33         top: 0;
34         left: 0.375rem;
35         width: 45%;
36         padding-right: 0.625rem;
37         white-space: nowrap;
38     }

```

And now, the end result is seen in the image below.



**Figure 4.2:**

[[https://css-tricks.com/responsive-data-tables/.](https://css-tricks.com/responsive-data-tables/)]

Some of the most popular techniques are:

- Hidden Columns - Selected by User
- Horizontal Scroll
- Fixed Header
- Flip Scroll
- User Resizable Columns
- Long Two Column

In the following sections we will try to give a brief but detailed description of what exactly each technique consists of, as well as the reason to include this techniques on tables, and the code required to implement such techniques.

## 4.1 Horizontal Scroll

When the allocated space is too small - horizontally, instead of hiding it, a horizontal scroll bar (just for the table) is created. The user can then scroll away.

Horizontal Scrolling represents a technique that resizes the table into columns at small screen resolution [David Bushell 2016]. This is different from viewport scrolling as we scroll only through the table.

It is very useful technique when presenting large data sets with identifiers in the first column. Then is very easy for every user to compare data content with multiple identifiers[Andrew Coyle 2017].

This solution works for following browsers:

- Google Chrome
- Mozilla Firefox
- Internet Explorer
- Opera
- Microsoft Edge

It is impossible to find one size that fits all solution. Data comparing is very difficult on the small screens. There are a lot of possible workarounds for this issue, but no one can solve this problem [David Bushell 2016]. Our implementation of horizontal scrolling creates table elements scrollable, but also can not solve the issue to the end[David Bushell 2016].

The code required to implement this technique on a table is shown below.

```

1 .rtable {
2
3     display: inline-block;
4     vertical-align: top;
5     max-width: 100%;
6
7     overflow-x: auto;
8
9     // optional - looks better for small cell values
10    white-space: nowrap;
11
12    border-collapse: collapse;
13    border-spacing: 0;
14 }
```

This CSS code represents CSS class `.rtable` used in the case when container is not resized. With `display: inline-block` all items are listed horizontally instead of vertically.

`vertical-align` property maintains how elements set next to each other in a line.

The `overflow` property determines whether to crop content or to add scroll bars (along the x-axis) when a table's content is too big to satisfy some screen resolution.

We can use `white-space: nowrap` property as optional for small cell values. CSS border properties are used to control borders into a table[David Bushell 2016].

An example HTML table with this technique is shown below.



2019 Jaguar I- Pace	Jaguar	0.0	0	394	513	0.0:1	0	62,400.00
2020 Mercedes- Benz GLE 450	Mercedes- Benz	3.0	4	362	369	10.5:1	22	54,900.00
2019 Nissan Altima	Nissan	2.5	4	188	180	8.0:1	32	21,500.00
2019 Ram 1500	Ram	5.7	8	395	410	11.3:1	23	28,600.00
2019 Subaru Ascent	Subaru	2.4	4	260	277	10.6:1	22	28,700.00
2019 Toyota Rav4	Toyota	2.5	4	219	184	13.0:1	39	22,900.00
2019 Volvo XC40	Volvo	2.0	4	248	258	10.8:1	26	30,300.00

**Figure 4.3:**  
[Screenshot taken by the author.]

## 4.2 Fixed Header

When the table is vertically long, the table's header is fixed to the top of the table's view. As we scroll down, the table's header is kept always visible.

It is very useful to have the fixed header (first row containing the header cells) fixed on the top of the table, when presenting tables with a particularly large data set. This helps users to quickly determine what every column identify rather than need to scroll back to the top of the table every time.

Fixed Header provides information that allows the user to always know in what column the cell the user is looking at is in.

This is very effective feature that makes our life easier [Andrew Coyle 2017].

This solution works for following browsers:

- Google Chrome
- Mozilla Firefox
- Internet Explorer
- Opera
- Microsoft Edge

```

1 .fixedHeader tbody {
2     display: block;
3     overflow: auto;
4     width: 100%;
5 }
6
7 .fixedHeader thead tr {
8     display: table;
9     width: 100%;
10    table-layout: fixed;
11 }
12
13 .fixedHeader thead, .fixedHeader tbody tr {
14     display: table;
15     width: 100%;
16     table-layout: fixed;
17 }
18
19 .fixedHeader thead {
20     width: calc( 100% - 0.6em );
21 }
22
23 .fixedHeader td {
24     width: 100%;
25 }

```

<tbody> element is determined with the type of rendering box.

With `overflow: auto`, a scrollbar will appear along y-axis.

All <thead> and <tbody> rows will behave as table elements.

Fixed table layout algorithm is used to control table and column widths.

Width for almost every table element is static, just the header has non-static width [Frederic no date].

The width of header is determined with the `calc()` function to allow responsiveness [w3schools.com no date(a)].

An example HTML table with this technique is shown below.

Car	Manufacturer	Engine Size(L)	Cylinders	Horsepower	Torque	Compression Ratio	Miles per gallon	Price(€)
2019 GMC Sierra 1500	GMC	4.0	6	285	305	11.0:1	16	26,600.00
2019 Honda Passport	Honda	3.5	6	280	262	11.5:1	21	28,700.00
2019 Jaguar I-Pace	Jaguar	0.0	0	394	513	0.0:1	0	62,400.00
2020 Mercedes-Benz GLE 450	Mercedes-Benz	3.0	4	362	369	10.5:1	22	54,900.00

**Figure 4.4:**  
[Screenshot taken by the author.]

### 4.3 Flip Scroll

This technique is useful for an object-based table; one where each row is populated by a single ‘object’ where each column represents a different feature of the object. If all features – columns – cannot be seen at once, it is sometimes more desirable to be able to show all features of an object rather than a good amount of (incomplete) features for a good amount of objects.

Rather than having the user scroll through features, the user is now able to scroll through objects horizontally instead. This is the result of transposing the table. The first column will now house the (previously column) headers and each column will be devoted to an object, rather than each row.

Flip scroll also ‘promises’ to keep the table in the allocated space – by allowing table horizontal scrolling.

This solution works for following browsers:

- Google Chrome
- Mozilla Firefox
- Internet Explorer
- Opera
- Microsoft Edge

```

1 table.flipscroll{
2     width: 100%;
3     overflow-x: auto;
4 }
5
6 table.flipscroll tbody tr {
7     display: inline-block;
8     vertical-align: top;
9 }
10
11 table.flipscroll tbody {
12     display: block;
13     width: auto;
14     position: relative;
15     overflow-x: auto;
16     white-space: nowrap;
17 }
```

Setting width: 100% and overflow-x: auto makes the table horizontally scrollable and stick to the allocated space.

The trick is setting the attribute display: inline-block on the tbody tr HTML tag and white-space: nowrap on the tbody HTML tag [Simon Elvery no date].

Following image represents an HTML table with Flip Scroll:

<b>Car</b>	2019 Acura RDX	2019 Ford Ranger	2019 Genesis G70
<b>Manufacturer</b>	Acura	Ford	Genesis
<b>Engine Size(L)</b>	2.0	2.3	2.0
<b>Cylinders</b>	4	4	4
<b>Horsepower</b>	272	270	252
<b>Torque</b>	280	310	260
<b>Compresion Ratio</b>	9.8:1	10.0:1	10.0:1
<b>Miles per gallon</b>	28	21	22
<b>Price(€)</b>	33,600.00	21,800.00	31,300.00

**Figure 4.5:**  
[Screenshot taken by the author.]

## 4.4 User Resizable Columns

This technique empowers the user quite significantly. As the title suggests, the user is able to manipulate the size of a table's columns.

This technique is useful when the user is immune to space limitation penalties the table might have on most other users. For example, if a user has a screen big enough that space between columns is wasted to keep column sizes consistent, being able to resize this column to bring other columns into view is highly desirable.

User Resizable Columns allows the user to tailor the table's experience to his/her own preferences.

There are two possible solutions. Both work for following browsers:

- Google Chrome
- Mozilla Firefox
- Internet Explorer
- Opera
- Microsoft Edge

Solution using only CSS and HTML:

```

1 <thead>
2   <tr>
3     <th title="Car">
4       <div class = "resizecell">Car</div>
5     </th>
6     <th title="Manufacturer">
7       <div class = "resizecell">Manufacturer</div>
8     </th>
9     <th title="Engine Size(L)">
10      <div class = "resizecell">Engine Size(L)</div>
11    </th>
12    [...]
13  </tr>
14 </thead>

```

```

1 .resizecell {
2   resize: horizontal;
3   overflow: auto;
4   width: 100%;
5   hyphens: auto;
6 }

```

Encapsulating every header cell (or every single cell) with a <div> tag allows CSS to enable resizeability by setting the attribute `resize: horizontal` to these divs [w3schools.com no date(b)].

Following image represents an HTML table with User Resizable Columns using only HTML and CSS:

Car	Manufacturer	Engine Size(L)	Cylinders	Horsepower
2019 Acura RDX	Acura	2.0	4	2
2019 Ford Ranger	Ford	2.3	4	2
2019 Genesis G70	Genesis	2.0	4	2
2019 GMC Sierra 1500	GMC	4.0	6	2

**Figure 4.6:**  
[Screenshot taken by the author.]

Solution using JavaScript (jQuery):

```
1 ~/js/jquery.resizeableColumns.js
2
3 $(function(){
4   $('table').resizeableColumns();
5 });
```

The trick is calling the `resizeableColumns()` on the table of your choice [Jo-Geek 2019].

Car	Manufacturer	Engine Size(L)	Cylinders	Horsepower	Torque	Compression Ratio	Miles per gallon	Price(€)
2019 Acura RDX	Acura	2.0	4	272	280	9.8:1	28	33,600.00
2019 Ford Ranger	Ford	2.3	4	270	310	10.0:1	21	21,800.00
2019 Genesis G70	Genesis	2.0	4	252	260	10.0:1	22	31,300.00
2019 GMC Sierra 1500	GMC	4.0	6	285	305	11.0:1	16	26,600.00
2019 Honda Passport	Honda	3.5	6	280	262	11.5:1	21	28,700.00
2019 Jaguar I-Pace	Jaguar	0.0	0	394	513	0.0:1	0	62,400.00
2020 Mercedes-Benz GLE 450	Mercedes-Benz	3.0	4	362	369	10.5:1	22	54,900.00
2019 Nissan Altima	Nissan	2.5	4	188	180	8.0:1	32	21,500.00
2019 Ram 1500	Ram	5.7	8	395	410	11.3:1	23	28,600.00
2019 Subaru Ascent	Subaru	2.4	4	260	277	10.6:1	22	28,700.00
2019 Toyota Rav4	Toyota	2.5	4	219	184	13.0:1	39	22,900.00
2019 Volvo XC40	Volvo	2.0	4	248	258	10.8:1	26	30,300.00

**Figure 4.7:**  
[Screenshot taken by the author.]



## 4.5 Long Two Column

Just like Flip Scroll, this technique is useful for an object-based table; one where each row is populated by a single 'object' where each column represents a different feature of the object.

Rather than having the user scroll through features, the user is now able to scroll through objects vertically instead. This is the result of transposing the table. The first column will now house the (previously column) headers and the second column will house the data previously housed in the first row. This creates a 'minitable' for the (previously) first row. For the next object (and row), another 'minitable' is created like with the first one and then appended below. This approach creates a 'minitable' for each object and appends it to the previous object.

As the name suggest, you end up with a long table of 2 columns, the first of which is 'always the same'.

Unlike Flip scroll, it does not keep the table in the allocated space, unless you set vertical scrolling.

This solution works for following browsers:

- Google Chrome
- Mozilla Firefox
- Internet Explorer
- Opera
- Microsoft Edge

```
1 table, thead, tbody, th, td, tr {
2     display: block;
3 }
4
5 td {
6     /* Behave like a "row" */
7     border: none;
8     border-bottom: 1px solid #eee;
9     position: relative;
10    padding-left: 50%;
11 }
12
13 td:before {
14     /* Now like a table header */
15     position: absolute;
16     /* Top/left values mimic padding */
17     top: 0;
18     left: 6px;
19     width: 45%;
20     padding-right: 0.625rem;
21     white-space: nowrap;
22 }
```

The trick is setting the table's elements to `display: block` and the `<td>` tag's attribute to `position: relative` [CSS-Tricks no date].

Following image represents an HTML table with Long Two Column:

Car	2019 Acura RDX
Manufacturer	Acura
Engine Size(L)	2.0
Cylinders	4
Horsepower	272
Torque	280
Compression Ratio	9.8:1
Miles per gallon	28
Price(€)	33,600.00
Car	2019 Ford Ranger
Manufacturer	Ford
Engine Size(L)	2.3
Cylinders	4
Horsepower	270
Torque	310

**Figure 4.8:**  
[Screenshot taken by the author.]

## Chapter 5

# Recommendation

### 5.1 Recommendation

Responsive tables must be able to efficiently and effectively display data. It is only through a combination of good table design and responsive techniques one is able to achieve this.

For good table design, it is imperative that you include Alternate Row Highlighting. This is a very simple technique that works on every browser and is not only helpful to the user but to the developer as it adds positively to the aesthetics.

For a “Jack of all trades” approach, we suggest the following responsive techniques: Long Two Column, and Fixed Header. You are able to apply this for the 3 main screen sizes: PC, tablet, and phone. Being able to apply Long Two Column to phone-sized screens (or tablets in vertical mode) and leave Fixed Header on the remaining two sizes (PC and tablets in horizontal mode) automatically eliminates one of the 3 sizes you have to take care of.

Another thing to keep in mind is to attach the vertical scrollable feature of Fixed Header to the Long Two Column. This ensures that the space the table is taking up is exactly the one allocated to it. It goes without saying that if the table is too wide (horizontally), it should be horizontally scrollable.

The figure below shows these techniques working together.

Car	Manufacturer	Engine Size(L)	Cylinders	Horsepower	Torque	Compression Ratio	Miles per gallon	Price(€)
2019 Acura RDX	Acura	2.0	4	272	280	9.8:1	28	33,600.00
2019 Ford Ranger	Ford	2.3	4	270	310	10.0:1	21	21,800.00
2019 Jaguar I-Pace	Jaguar	0.0	0	394	513	0.0:1	0	62,400.00
2020 Mercedes-Benz GLE 450	Mercedes-Benz	3.0	4	362	369	10.5:1	22	54,900.00
2019 Nissan Altima	Nissan	2.5	4	188	180	8.0:1	32	21,500.00
2019 Ram	Ram	5.7	8	305	410	11.2:1	23	28,600.00

**Figure 5.1:**  
[Screenshot taken by the author.]

As you scroll through the table, notice the Fixed Header Technique in the image below.

Car	Manufacturer	Engine Size(L)	Cylinders	Horse power	Torque	Compression Ratio	Miles per gallon	Price(€)
2019 Nissan Altima	Nissan	2.5	4	188	180	8.0:1	32	21,500.00
2019 Ram 1500	Ram	5.7	8	395	410	11.3:1	23	28,600.00
2019 Subaru Ascent	Subaru	2.4	4	260	277	10.6:1	22	28,700.00
2019 Toyota Rav4	Toyota	2.5	4	219	184	13.0:1	39	22,900.00
2019 Volvo	Volvo	2.0	4	248	258	10.8:1	26	30,300.00

**Figure 5.2:**

[Screenshot taken by the author.]

For small-sized screens, the technique that would “kick in” is shown in the image below. Notice the ‘creeping’ second ‘minitable’ in the bottom part.

Car	2019 Acura RDX
Manufacturer	Acura
Engine Size(L)	2.0
Cylinders	4
Horsepower	272
Torque	280
Compresion Ratio	9.8:1
Miles per gallon	28
Price(€)	33,600.00
Car	2019 Acura RDX

**Figure 5.3:**  
[Screenshot taken by the author.]



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