



## Responsive Web Design

Balasubramanian V and Shivani Dole

Department of Computer Science and Engineering, VIT University, Vellore.

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### ABSTRACT

This paper presents the concept of Responsive Web Design and Development for Web Applications meant to be present on screens of different resolution like desktop, tablets and mobile phones. It brings into light some of the features of Web Application and Native Applications and how the difference between them is narrowing down. A brief look into the traditional form of web designing is also mentioned in order to understand its drawbacks. It also focuses on the concepts of Media Queries and Twitter Bootstrap, a new front end framework. It overall brings into limelight the new perspective of Web Development so as to make it more flexible and efficient.

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### Introduction

Responsive Web Designing is a new emerging technology in Web Development. It is a field of making the outcomes of web development more presentable and facilitates code reusability. The paper will further provide the basic yet interesting idea of how this field is doing extremely well in Web Technologies and how it comes up to be the most happening and required area of research. From the time Web Applications came into existence, the entire focus used to be on product development for desktop screen. Gradually native applications also came into existences which are specific to certain devices or platforms like tablet, Smartphone etc. Native Applications have the capability to access device software or hardware features in order to enhance their functionality and extendibility. There used to be a huge gap between the concept of Web Application and Native Application which is narrowing down. This has resulted due to the concept of Responsive Web Design which targets on scaling down a Web Application in such a way so that our Application fits into screens of different resolutions say it for desktop or tablet landscape or tablet portrait or mobile. This in turn provides the biggest advantage of code reusability. The need for Application which supports multiple screens is growing in business since that provides more users to access their product and can align to any phone manufacturer.

Basically, we design our layout across a fluid grid system and there are triggers associated with the grid that enable our layout to rearrange itself according to the screen. This is how responsive layout works. HTML5 has a huge contribution on this since it assists to create mobile friendly version of Web Application. This has brought a revolution in web languages. The mobile phones including Smartphone and tablets have a superior interface which give a better look and feel of an application running on them, that is, if only the web application are made responsive to fit in different resolution screens, the

application can be presented so well. Moreover, it is impractical to try to design and maintain different websites for multiple platforms.



Web application made in this way are also considered better at times since they have direct control over the application's distribution and cost advantages. The responsive layout is quiet convenient to implement in web application then implementation of native application which needs skills like Objective C etc. The browser compatibility on web enabled phones make responsive web application more significant. Responsive web design is based on three important concepts of Flexible Grid, Flexible Images and Media queries. We override the default viewport and load style files for particular viewport. This is how it all works. Every business is going mobile way now and so every business needs to have a mobile friendly version of their websites in order to maximize user experience.

### Traditional Web Designing

With the advent of Web Development, web designing was meant for static websites which shows no change on viewing them on different resolution screens. Such traditional web designing is quiet easy, cheaper and quicker to perform since the entire layout is kept fixed and unresponsive. No pre analysis is required to be taken care while building such traditional websites. So we have a horizontal scrollbar every time they are viewed on handheld devices or on smaller resolution. As a

Tele:

E-mail addresses: [vbalasubramanian@vit.ac.in](mailto:vbalasubramanian@vit.ac.in),  
[shivani.vit@gmail.com](mailto:shivani.vit@gmail.com)

result, there is an overhead of building different web sites for different devices since the user view is extremely inconvenient and harder to convince for companies where websites are the prime profitable marketing tool. In that case, companies previously used to maintain several versions of their websites to be made available on different devices. So a change made anywhere needs to be performed on every version which is totally time consuming and inefficient. Another greatest disadvantage is that there is a need of more than one URL for the websites maintaining different versions on different devices which can be eliminated in case of responsive web designing. There is a consistent competition on Internet for business websites to get the top rating to get to the top on search engines. Getting ratings from the same URL fetches greater votes instead of sticking on only one of the version of multiple websites in case of traditional web designing. So this is why there is a move towards responsive web design which is quiet optimal, future proof and device oriented. The same design can work perfectly on traditional PC at the same time on a mobile device as well.

### Flexible Grid And Flexible Images

Through the journey of Responsive Web Design, it is clear that the elements we put in our markup need to be more fluid or more proportional rather than having fixed dimension at all places so that they can occupy spaces according to the platform they are used on. This implies that a relative measurement is required while fixing the dimensions. Instead of using pixels we have em as the new unit for measurement. It simply uses the concept that takes the target value and divides it by the context value which fetches a relative value in em ready to be used for the required dimension. This is done so that when the flexible grid resizes itself, the proportion between different elements is maintained. The flexible grid is like a container which is mentioned in percentage terms rather than maintaining a fixed layout so that it expands and contracts as the viewport does. In addition to a flexible container, the margin and padding is also taken into consideration making the layout more fluid. The context for each one of them changes while calculation their values in em. Thus Flexible Grid requires a bit of mathematical calculation as well as it is also about being context-aware and keep a better understanding of the ratio-based relationships between element and container.

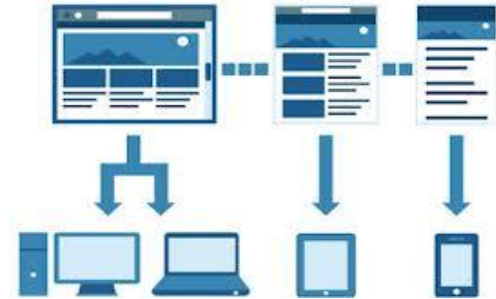
With the advent of Internet full of images, only fluid grid for text is not good enough. So here comes into picture the requirement of Fluid Images.

The images wider than their containing elements are forced to fit the width of their container by setting their maximum width to 100%. Or the other way is to clip off the image by setting the overflow property to hidden. This conceals an image flowing out of the container fixing the requirement of an image being in proportion to the containing element.

### Media Queries

The advent of mobile devices and increasing use of applications has developed a challenge for web developers to make their application competitive enough to stand in front of native application. The Web Products need to have span across various devices. Media queries provide a medium to overcome this challenge by enabling definition of designing styles for different screen resolution as well as for different media types. Various media types created by W3C are all, print, projection, screen, Braille, embossed, handheld, print, tv, speech etc. Media Queries come into role here since they tailor CSS for each of these media types. Taking into consideration screen and

handheld devices as media type, we have a method for responsive web designing here. There is a conditional loading of style sheet that's making the display of our application responsive. Different features are used in media queries for setting styles like device width, device height, aspect ratio, resolution, color etc. Each of these features can be specified with minimum and maximum values. Media queries are applied while checking for styles required for different resolution screen which is done using Firefox plug-in or responsive web views tool available in browsers like Mozilla. This helps to get response of media queries without even testing on actual devices.



There occurs certain browser issues that some of the older versions do not recognize media queries but these issues are easily tackled by certain keywords like 'only' which is provided in the query itself. Normally, the media queries are supported in all major advance browsers accept some older versions of IE. The layout rendered by media queries is fluid fitting on different devices. This fluid layout is like a grid where different components of a web application fit in and move flexibly according to device requirement. Every dimension of component is presented as relative to the screen size and accordingly changes in size and other aspects if scaled down to lower resolution. Thus media queries help the web applications to shrink and grow according to the screen resolution of the user.

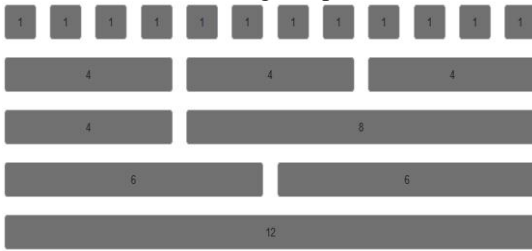
### Twitter Bootstrap

Twitter Bootstrap is a framework used on front end for making web development flexible, responsive and convenient. It is a library of CSS files which include classes for Grid System, Layouts, Tables, Forms, and Navigation etc. These classes are used directly for including styles and features for implementing all of it. It encourages less use of CSS and can be used with JQuery. Bootstrap provides support in all modern and major Web Browsers.



The Grid system pattern is the most outstanding concept that again helps in creating responsive layout. It is introduced by Twitter for providing design help to web programmers. It saves a lot of time that developers need to write front end code. In addition to this it provides responsive CSS for mobile phones, tables and any other screen of different resolution apart from desktop. There is this concept of 12 column responsive grid system which is total 940px in width and is included in a container class for fixed layout. Basically, the columns of grid contain the divisions of web page where the content is placed accordingly. When the screen resolution is scaled down, the content fit in itself properly so that the web page turns out to be responsive in nature. We create column grid with the help of span class. There can be 12 columns created through span class. This pattern of grid system provides both fixed and fluid layout

designing facility. Therefore, we have facility here to create single, double or multi-column grid upto 12 in number.



There are a whole lot of classes available in Bootstrap framework for layouts, thumbnails, progress bar, pagination, icons, form, tables etc. They assist in creating fixed as well as fluid layout in a class apart from the grid arrangement. There are classes available for creating thumbnails. Thumbnails are the grid of images, video, text paragraph as default or customized. This feature helps in building company or publicity websites for promotion of products in a row. Thumbnail feature is supposed to present details of products which are to be showcased in a nutshell. Moreover, the progress bars are used to show loading, redirecting or progress status of a process is presented in attractive forms with animations and colors using Twitter Bootstrap. The breadcrumb style for showing the follow up sections can also be presented with this framework class breadcrumb. In order to create messages for showing error or successful information with some styles, there are classes like alert-info, alert-error, alert-success, alert-header in Bootstrap. The Pagination feature can also be included with pagination or pager class where either the links are provided to move to different sections or in a way to move to newer, older, previous or next link. Observing all this, this front end framework seems to bring a revolution in web development. Static navigation bars with dropdown can also be added with CSS classes of Bootstrap. Icons available in Bootstrap are images used in buttons, for navigating and several other purposes and using icon class names, they can be embedded in web applications. All the icons used in Bootstrap are provided by Glyphicons. Bootstrap also has styles for Form elements and classes for presenting them in

vertical, horizontal or inline layout. The toolkit also creates headings, paragraphs, lists and other inline elements. So we see that the screen design facilities from this toolkit spans the area of web designing quiet well.

### Conclusion

Therefore, we see that Responsive Web Designing let us develop Web Applications for screens rather than for devices or browsers or operating system. It provides the advantage of code reusability, support for screens or media types of different resolution. It is efficiently using the capabilities of CSS3 HTML5 and related frameworks like Twitter Bootstrap for front end to manage this transition. The concept of Flexible Grid, Flexible Images, and Media Queries are new yet carry a vast development future for Web Developers. It is interesting to learn the related frameworks and makes use of them for utter convenience in Web Designing. This field is still growing mature although and there is no specific workflow for such development but developers are using different methodologies so as to achieve an optimal and safe result.

### References

- [1] Ben Frain, Responsive Web Design with HTML5 and CSS3
- [2] Web Application, <http://mobithinking.com/native-or-web-app>
- [3] Twitter Bootstrap, <http://www.w3resource.com>
- [4] Ethane Marcotte, "Responsive Web Design"
- [5] Native Application, <http://searchsoftwarequality.techtarget.com/definition/native-application-native-app>
- [6] Media Queries, <http://css-tricks.com/css-media-queries/>
- [7] Twitter Bootstrap, <http://twitter.github.com/bootstrap/>
- [8] Responsive Design, <http://www.bigbossmas.com/web-development/responsive-web-design-designing-a-website-for-mobile-devices/>
- [9] Traditional Web Design, <http://www.worldnz.co.nz/blog/post/responsive-website-designs-vs-traditional-website-designs>