Responsive Web Design and Web Development Using Bootstrap Frond-End Framework

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ABSTRACT

*Responsive Web design and Web Development which is aimed to provide design and development should respond to the user's behavior and environment based on screen size, platform and orientation. A web design implementation consists of a mix of flexible grids and layouts, images and an intelligent use of HTML5 & CSS3 media queries. The web site layout changes based on the size and capabilities of the device. As the user switches from their laptop to Smartphone or any other such devices like iPad, iPhone, Tablet, etc., the website should automatically switch to provide accommodation for resolution, image size and scripting abilities. The website should have the technology to automatically respond to the user's preferences. It is worth putting extra consideration that, this would remove the need for a different design and development phase for each new gadget on the market. Responsive web design (RWD) is a web design approach basically aimed at crafting sites to provide an optimal viewing experience. In this paper also discuss about twitter bootstrap and angularJS framework which is an important toolkit for responsive web development (**such as easy reading and navigation with a minimum of resizing, panning, and scrolling — across a wide range of devices from desktop computer monitors to mobile phones**).*

*Keywords: Web Design, Web Development, Responsive, Bootstrap*

I. INTRODUCTION

"Responsive web design and web development" seems complex, but it's very easy to implement in real time application. During earlier days, web designers were in a situation to create a separate web page for mobile version. Now, with the help of advanced technologies, it is possible to maintain just one site for both computer and mobile devices. A responsive web page is one that "responds to" all devices. While creating the website, web designer should create the website in such a way that, web site content resizes itself depending on the type of device or we can say that web content displays properly on all major types of devices and that device can be an over sized desktop computer, laptop, tablet or smartphone.

Responsive web design is an approach to web development that provide a pleasant user experience to design and optimize from the outset for all touch points they need to support regardless of screen size or device orientation. Responsive web design and web development solves the problem of building the same code work across multiple screen resolutions. If you resize your browser window or move on different device like smart phone,

you'll see the screen elements resize themselves. Practically speaking, this involves three main principles Fluid Grids, Fluid Images, and Media Queries that come together to form the whole that is responsive design.

A responsive site responds within the constraints of the user device to deliver an experience that is contextual to the size of the screen.


| Desktop | Tablet | Phone |
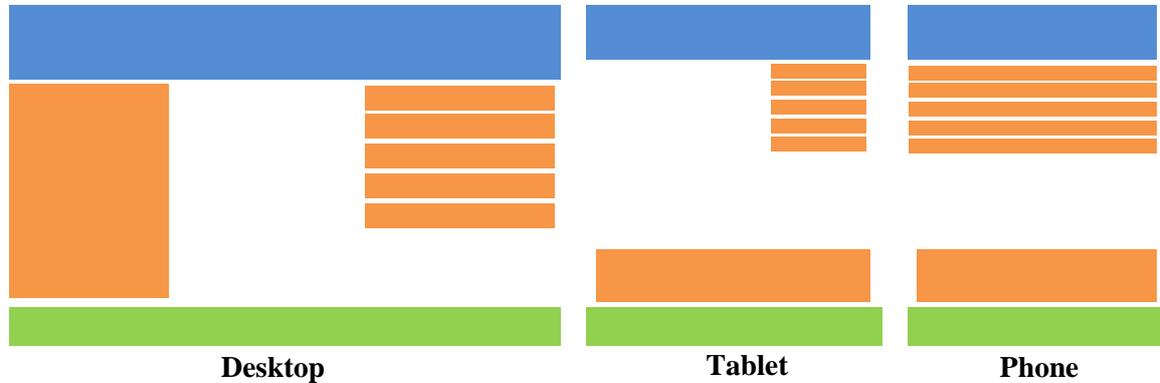
II. STATEMENT OF PROBLEM

During past web design and web development implemented in various and different version of the same web site for various user types. This practice leads to a couple of logistical issues like You have to pay for multiple web designs, You'll have to run separate SEO/internet marketing campaigns, You end up spending much more time and money than is really necessary.

III. NEED OF RESPONSIVE WEB DESIGN AND WEB DEVELOPMENT

Web site should display in appropriate manner on various devices. Visit any one website on various devices and you feel different because one web content display different manner in different devices based on resolution, screen size, orientation. You can see how the web pages change their layouts to fit on the appropriate device. For example, if you change the web browser into a bigger size or smaller size, you will see the website's layout refitting the new windows size in real time.

Responsive web design and development uses CSS media queries which help to adjust the web page on different devices based on orientation, screen size, color capability, resolution, etc.
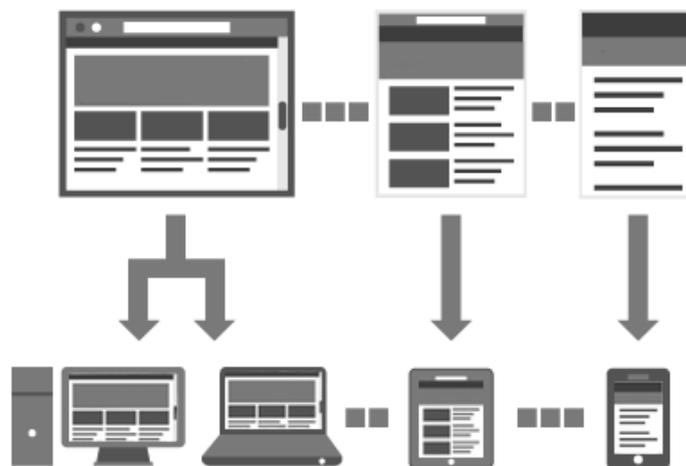
III. ARCHITECTURE OF RESPONSIVE WEB DESIGN AND WEB DEVELOPMENT

Responsive Web templates with out-of-the-box support for HTML5, CSS3 and Media Queries. Web properties built using this framework will automatically scale from phones to tablets to a full desktop experience without any manual intervention from the content editor.

To start building a new responsive web site following points need to be considered:

4.1 Fluid Grid

Fluid websites are built using percentages for widths. As a result, columns are relative to one another and the browser allowing it to scale up and down fluidly.

In fluid grids we define a maximum layout size for the design in percentage manner. The grid is divided into a specific number of columns to keep the layout clean and easy to handle. Then we design each element with proportional widths and heights instead of pixel based dimensions. So whenever the device or screen size is changed, elements will adjust their widths and heights by the specified proportions to its parent container.

It's a flexible width path. We should stop using pixel-based sizes; instead we use the em or percentage in the style sheet. This feature help us to make designing for multiple screens easier. Here the column widths are proportional rather than fixed. Fluid web page design can be more user-friendly, because it adjusts to the user's set up.

```
width: 1126px; will be width: 98%;
```

4.2. Flexible Images

The usage of fluid images causes the adjustment of the size to the parent block. The images will scale out according to the screen resolution/size. If the parent block is smaller than the size of image then the image is reduced proportionally.

The most common relative solution is to set the max-width of the image at 100%. The max-width style means that an image won't exceed the width of its container. Instead of specifying a width and height on the image tag, it's best just to add the image tag without that information and rely on the max width.

```
img {
    max-width: 100%;
    height: auto;
}
```

The image will be responsive to scale down or up in relation to the container it's in, with the caveat of not scaling any bigger than its actual size (i.e. max-width: 100%) which ensures that the quality of the image will not degrade by being expanded too much.

4.3. Media Queries (@media)

A new feature in HTML5 and CSS3 known as "media queries" allows capable browsers to detect the size of the user's screen.

The @media query is 1/3 of the recipe for responsive design. It is the key ingredient that, in it's simplest form, allows specified CSS to be applied depending on the device and whether it matches the

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media query criteria. Media queries allow the page to use different CSS style rules based on characteristics of the device the site is being displayed on, most commonly the width of the browser.

Media queries are used to write css for specific situations, which allows you to apply styles based on the information about device resolution. It can be set to detect such features as width, height, screen orientation, aspect-ratio and resolution. And also used to change the layout sizes and rules based on various devices. We have to specify some break points in the CSS.

```
@media only screen and (max-width: 768px) {}
@media only screen and (max-width: 320px) {}
```

These are the key steps:

* Research/scoping:

  Understanding the additional requirements for a responsive site.

  Research is always a very important stage in the design process so it's worth putting a little extra consideration into the people who will be using Although a responsive site will only change the CSS depending on the width if there are complicated elements that rely heavily on JavaScript, they may not translate well on a smaller device and it could be worth hiding these.

* Wire framing:

  Grid structures and layouts for the site considering different screen widths

  The logic behind how the styles should change can be a bit hard to define and the magic of it will really come out in the build of the site, but we need a way to start defining the different width stages of the layout.

* Look and feel: Style considerations

* Building the site: HTML & CSS issues

  Responsive Web properties are based on fluid grids in which all page elements are sized by proportion, rather than pixels. Rich media content, such as images, are also resized based on the display requirements.

Three key technical features at the heart of responsive Web design include:

A flexible grid-based layout that uses relative sizing for online objects

CSS Media queries that check the capabilities of the target mobile device and apply different style sheets as needed Flexible images and media, through dynamic resizing or CSS

IV. ADVANTAGES RESPONSIVE WEB DESIGN AND WEB DEVELOPMENT

1. Increased sales – All major types of devices are accommodating by all user, you make it easy for your visitors to buy from you.

2. Less Maintenance – Responsive web design reduces maintenance cost and effort due to single link.

You have to maintain only one website for all type of devices such as desktop, mobile phones, tablets, notepads etc… Responsive web design needs only one set of content. Due to that, you don't need to create a separate website for different kind of devices like smart phones, iphones, blackberry phones, tablets, etc. Web designers use CSS (Cascading Style Sheet) code media queries to swap out from the current view and change into the viewers' screen dimensions.

Once web content are loaded, the CSS re-sizes the browser window (it drags the corners so it becomes either smaller or larger) and you will notice the content on the screen adjust itself accordingly.

Since responsive web development has code for all the sites in one middle vital area, adjustments can be done without trouble for any devices. It saves money, time, manpower, etc. It is one of the greatest advantages of responsive web design.

The alternative - maintaining multiple websites for different devices convolutes your design and maintenance processes. With a single design, updating content is much easier, and it's simpler to coordinate your online marketing efforts.

Because you don't require revising the main site and then the mobile site, single change will update the content across everything. This is usually easier for your team if you use a content management system, or for your web design agency. Either way, it makes it a lot easier to continue on top of content and keep track of what's been changed.

3. SEO is greatly simplified – SEO has various factors, but one of the most powerful factors involves how many worth links point to your website. Imagine how much more work would have to be done if you had to attract links to three different websites! With responsive web design you will create only one URL for all kind of devices. Due to that your search engine optimization will not get diluted with different URLs. So, you can easily improve the SEO ranking for your website.

If you have one URL, it will help you in your SEO by accumulating all page traffic rather than collecting traffic from different versions. For responsive design, there is no need to create particular content for mobile version, so you can adjust your content for all devices.

4. Easier Web tracking/Analytics – Responsive web design and development uses a solitary URL. Due to that, instead of analyzing data from every different website, a solitary URL makes the tracking of website much easy. It will be easier for your analytics specialists to observation of the traffic and calculate your productivity if you use responsive website design.

5. Single code base – build once, run across all devices. If you implement responsive website design, then, you have a single design for various devices. So, it is surely easier to observe and control one instead of two or three.

6. Renders across any screen size – One can view the web site content on 20″ monitors, 15″ laptops, 10″ netbooks, 7″ tablets, 3″ smart phones or any other size of device and every size between. It also considers the enormous difference in widths and heights, whether the screen is landscape or portrait, and screen resolution.

7. Provides control and flexibility – Changes can be made at solitary centralized place. You do not require contacting multiple vendors to make changes when your mobile site/ mobile application are built by different development companies.

8. Give Better user experience –One of the main advantages of responsive web design and development is that it maximizes user experience on different devices. Users find it much easier to go and use the websites they are modified for the device they are using.

9. New Devices –Responsive web design can easily settle in itself according to the screen size, you need not worry about creating a whole new web site every time a new screen sized device is introduced in the market by the manufacturer.

10. Time and Money –The main benefit of responsive web design is you have to make only single version of your website for all type of devices, which saves you both time and money. Because every year numerous new devices are released so if you design website which supports any particular version of device then you are in the need of re-design your version of a website to be displayed properly on a new device.

IV. CHALLENGES OF RESPONSIVE WEB DESIGN AND WEB DEVELOPMENT

Along with all the above mentioned advantages there also be disadvantages associated with Responsive web design:

Developing and Implementing a responsive web design is not an easy task it will be a very challenging task.

1. Time Consumption – It will take more time for constructing responsive web design. Development and implementation of a website with responsive design is a time consuming process.

2. Limited support – A responsive website will function consistent with media queries which tell the current screen size being viewed on; older browser version won't have media queries. A responsive website operates according to media queries that tell it what screen size it is currently being viewed on; older browsers don't have these media queries.

3. Navigation menus – It will be difficult to set the complex navigation in comprehensive manner. The smaller the device, the less screen space you have to work with. This can make complex navigation difficult to set out in an intuitive and comprehensive manner.

4. Technical inconvenience – Taking into account the fact that responsive design is a new technology, it can be not useful for some people, as there still exist old devices and browsers, for which it will take too long to open the website.

5. Limited Resources – As it is a new concept, only limited resources are available. Due to this, you cannot get proper solutions for unknown problems.

6. Implementation Problem – Implementation of responsive web design takes a longer time than expected. Since it is a new concept, some unfamiliar problems are still there that we cannot fix.

7. Loading time – Due to unnecessary HTML/CSS code downloads in a mobile device, loading time is usually higher. It is one of the major drawbacks of responsive web design.

V. WORKING WITH RESPONSIVE BOOTSTRAP FRAMEWORK:

Bootstrap is the most popular framework for creating responsive layouts which support all devices. Bootstrap is a framework to help you design websites faster and easier. Bootstrap is a powerful toolkit which is a collection of HTML, CSS, and JavaScript tools for creating and building responsive, mobile-first web pages, web sites and web applications. It is a free and open source project framework, hosted on GitHub, and originally created by (and for) Twitter.

Bootstrap includes HTML and CSS based design templates for typography, forms, buttons, tables, navigation, modals, image carousels, and many other, as well as optional JavaScript plugins. It also gives you support for JavaScript plugins. Bootstrap is compatible with all modern browsers (Chrome, Firefox, Internet Explorer, Safari, and Opera).

To Build a Responsive Web Design with bootstrap, follow the following procedure:

1. Download Bootstrap and inline text editor

2. Install text editor

3. Extract the bootstrap files in to your project folder

4. Create html file and save it as index.html in the project folder

Exploring with bootstrap three main file included in this: bootstrap.css; bootstrap.js; glyphicons that is jquery.js and bootstrap.min.js and bootstrap.min.css files are included to make a normal HTM file to Bootstrapped Template.

So whenever you download bootstrap framework then you will notice three folders that are css, fonts, and js that contain the file which are most important powerful tool to make web design in responsive manner.

There are two ways to use Bootstrap in Webpage.

1. The first way is to use a CDN or Content delivery network.

2. The second way is downloading and storing a copy Bootstrap file in our web server or local machine.

3. Download from this link: http://getbootstrap.com/getting-started/#download

After Downloading Bootstrap framework include Bootstrap CSS, Bootstrap JQuery Library, and Bootstrap Javascript in your web site to make responsive. The ways you can include bootstrap file are shown in following way:

Include Bootstrap CSS

◦ *If you want to use the Bootstrap CDN:*

<link rel="stylesheet“ ref="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.6/css/bootstrap.min.css">

◦ *If you want to use your own copy of Bootstrap:*

<link rel="stylesheet" href="bootstrap-3.3.6/css/bootstrap.min.css">

Include JQuery Library

◦ *If you want to use the jQuery CDN:*

<script src="https://ajax.googleapis.com/ajax/libs/jquery/3.0.0/jquery.min.js"></script>

◦ *If you want to use your own copy of jQuery:* <script src="jquery-3.0.0.min.js"></script>

Include Bootstrap JavaScript

◦ *If you want to use the Bootstrap CDN:*

<script src="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.6/js/bootstrap.min.js"></script>

◦ *If you want to use your own copy of Bootstrap:*

<script src="bootstrap-3.3.6/js/bootstrap.min.js"></script>

Now, start working with bootstrap framework, you have to must know it, what kind of package included in bootstrap framework. The library includes:

➢ Scaffolding – A powerful fluid grid system,

➢ CSS – A large collection of built-in CSS and components, ready to use out the box

➢ Component – iconography, dropdowns, navigation, alerts, etc.

➢ JavaScript Plugins – Easy to integrate with minimal configuration

➢ Customize – Customize Bootstrap's components

Bootstrap can be a great tool to handle consistency in design and hence is a great choice for a large responsive web project.

VI.   CONCLUSION

Responsive Web Design is a rising trend that involves designing websites and applications for optimal presentation across multiple devices and screen sizes using a single code base. The major advantages of Responsive Web Design consist of a single code base that provides easy and low maintenance along with a distinct version of the website that improves SEO. Therefore, if you want a solution that's easy to maintain, makes use of existing skills, framework or tool and that you can control, then Responsive Web Design is the approach for you.

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