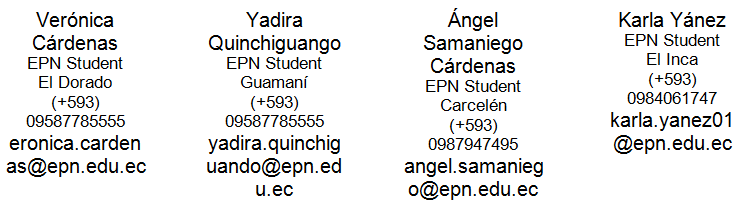
SNAKE GAME AS AN ACCESSIBLE WEB APPLICATION



**ABSTRACT**

In this paper we are going to introduce and develop how web accessibility is implemented in a web application to register families affected by the earthquake of April 16, 2016 in the Ecuadorian coast. For that, the document is going to include important terminology, the development of the system and a complete analysis of the solution that it contributes.

**CCS Concepts**

• **Visual impairments ➝ Problems related to visual condition which can be significant or severe problems.** • **Web application➝ Software created using web tools.** • **Web accessibility➝ is a universal application that can be used by any person.**

**Keywords**

Color-blindness, color blindness, web accessibility.

# INTRODUCTION

Much people have different visual disabilities, like color blindness, amblyopia, difficulty for distinguishing the depth, also there are people with dyslexia. All of these diseases don’t allow that the people have a normal life. These people can feel excluding or frustrated especially when they want to play video games. Therefore is essential to know these diseases and how it affects them, to develop video games thinking about how include them. So for making video games they should think first in web Accessibility.

# EARTHQUAKE AT ECUADORIAN COAST

The 2016 earthquake in Ecuador was a seismic movement occurred at 18:58 ECT in 16 of April, with its epicenter between Pedernales and Canton Cojimíes that parishes in the Ecuadorian province of Manabí. With a magnitude of 7.8 MW, is the strongest earthquake felt in the country since the earthquake in Colombia in 1979, and the most destructive earthquakes in Ecuador since 1987. The seismic waves arrived in southwestern Colombia, feeling that country in cities like Cali, Pasto, Popayan and Neiva; and to the northern border of Peru, in places like Tumbes, Piura, Cajamarca, Lambayeque and Amazonas.

In Ecuador are frequent earthquakes and their cause is almost always attributable to the tectonic processes of large subduction zones along the shores of the Pacific Ocean. This earthquake, with its epicenter on the coast of northern Ecuador, falls within this context of plate tectonics. Its origin is the thrust on the border or near the boundary between the South American continental plate and the Pacific (Nazca plate). Since the early twentieth century in Ecuador there have been seven major earthquakes in the same area, with epicenters located a few kilometers from the earthquake, such as 1906 and 1942. The largest of these is the 1906 earthquake and involved a complete rupture zone estimated at about 400-500 km and was accompanied by a tsunami, causing several hundred deaths. The 2016 event is located on the southern edge of the rupture zone of the 1906 earthquake. [1]

## Events

The earthquake of 7.8 magnitude on the moment magnitude scale rocked Ecuador's Pacific coast at 18:58 pm (UTC-05: 00 local time), the temblor was felt mainly in towns near the epicenter, located between the provinces of Manabí and Esmeraldas. However, the quake was also felt strongly in the other five provinces of the Ecuadorian coast (Guayas, Santa Elena, Los Rios, Santo Domingo and El Oro), 14 several provinces of the northern Sierra (Carchi, Imbabura, Pichincha and the Metropolitan District of Quito), and to a lesser extent others in the central and southern highlands (Chimborazo, Cotopaxi, Tungurahua, Bolívar, Cañar and Azuay).

After the strong earthquake, the Warning Center Pacific Tsunami located in Hawaii (United States), issued a precautionary tsunami warning for Ecuador, Colombia, Costa Rica, Panama and Peru, which was withdrawn around midnight the same day.17 18 According to statements by Vice President, Jorge Glas, preventive mobilization of the inhabitants of the coastal areas of the provinces of Esmeraldas, Manabí and Santa Elena was available, to any event that may be made by surf, given the magnitude of the earthquake. In addition, there were widespread power outages in several parts of the country. [2]

## Manabí

After the quake cities like Portoviejo, Manta, Chone, Montecristi, Bahia de Caraquez, Rocafuerte, Calceta, Puerto Lopez, Pedernales and Jaramijó were affected. Manta, the second largest port in the country suffer of the collapse of several buildings, including the control tower Eloy Alfaro International Airport as well as the loss of life and long hours without electricity and drinking water. Portoviejo city, provincial capital, also showed a significant number of human losses as a result of the collapse of infrastructure, letting at least 684 dead civilian. Jama, one of the counties in the province, was severely affected in its infrastructure and held incommunicado for several days. However, the town most affected in the province and the country was Pedernales, which later became known was the actual epicenter of the earthquake; the town was destroyed between 70 and 80% according to estimates, and for several days was impossible to access by land because of the severe damage suffered by the roads that connect it with the rest of the Ecuadorian territory. Due to the precarious situation and the high number of dead in the streets, the mayor Gabriel Alcivar, requested the donation of coffins and formaldehyde. [3]

## Esmeraldas

According to the Geological Institute of United States, the initial epicenter of the earthquake was attributed to a town of Canton Muisne. However, the Geophysical Institute of the National Polytechnic School confirmed that was farther south near Canton Pedernales in the province of Manabí. However, damage was caused in the province of Esmeraldas, as in the capital were affected 152 buildings including City Hall, while in the parish San José de Chamanga were reported 100 houses as affected. Although there were no deaths to mourn, 95% of the inhabitants of the town of Muisne were evacuated to shelters, mainly due to the collapse of 803 houses and lack of basic services for several days. Because of damage to the structural and electrical system, Carlos Concha Torres International Airport in the city of Esmeraldas, suspended its business operations. After the earthquake, and for security reasons, the Esmeralda’s refinery and oil and pipelines that reach the same suspended operations until further notice. [3]

## Earthquake victims

After the earthquake of April, thousands of people were left homeless due to the earthquake magnitude. Despite the efforts of official institutions to obtain information from the affected people, there are fears that some people, for various reasons, have not been taken into account in any of the operations of gathering information from victims. However, the lack of prevention not allowed conecer depth the number of older adults, women, men, children and people with disabilities who were affected. [4]

# COLOR BLINDNESS

Color blindness is a genetic defect that causes struggle for differentiate changes between certain colors, usually between green, red or blue. This sickness consists in the way in what the eyes perceive the colors. The human eyes have three different types of cones. Each type is sensitive to certain color: red, blue or green. Therefore every color perceived is a mixture of stimulation of stimuli of those three cone types.

Color blindness occurs when one or more cones are absent, don’t work well or detect a different color than normal. There are some causes.

1. **Genetic:** this is more common. It is when a person is born with color blindness. The X chromosome is which carries the gene that causes this condition. Consequently more men than women are affected.
2. **Acquired:** some people acquired this disease throughout their live, for different situations like accidents that affect their retinas or a particular area of their eyes or brain. Too medications, environmental chemicals such as carbon monoxide, age.

## Types of color blindness

There are some types depending of the cone that is affected to perceive the colors: green, red or blue. Red cone is known as protan, green as deutran and blue as tritan.

### Monochromatism:

### Cones no available or just one of them is available. There are three different types for monochromatic and anomalous, depending of the cone affected.

1. **Tritanopia**: when the cone which nonfunctioning well or is missed is the tritan cone. People with this condition do not distinguish shades of blue tones.
2. **Deuteranopia**: when the cone which nonfunctioning well or is missed is the deutran cone. People with this condition do not distinguish shades or green shades.
3. **Protanopia**: when the cone which nonfunctioning well or is missed is the protan cone. People with this condition do not distinguish shades or red tones.

### Dichromatism

One cone is missing completely. Just two different types of cones that is available.

### Anomalous trichromatism

The three types are available but with less sensitivity, these results in a small color spectrum perceived.

# 4. WEB ACCESIBILITY

# It is defined as the capacity of a person to use any web application even of their disability. This disability represents a problem that not allows someone to access to the web. For this reason, an initiative has been developed to enable the user to navigate, apprehend, recognize and interact with an application. [5] Also it is significant to consider the possibility of inclusion because it also benefit older people and not only children or young people.

# It considered auditory, speech, visual, cognitive, physical and neurological disabilities of people and a search a solution to solve the issue. [5] The central idea of universality is to make the Web more accessible to all handlers regardless of the situations and the devices involved when they want to access to information. Considering this point of view, accessible user will be both a disabled person and a person without any unfavorable condition.

The principal objective is reducing discrimination and exclusion in a society. The importance of accessibility is not only focusing in education or social topics, but also in entertainment and leisure activities. This topic encompasses all those involved in software development. The ones that create and the ones that are going to used it. Between the components that participate in this relation area included the ones shown in Figure 1.

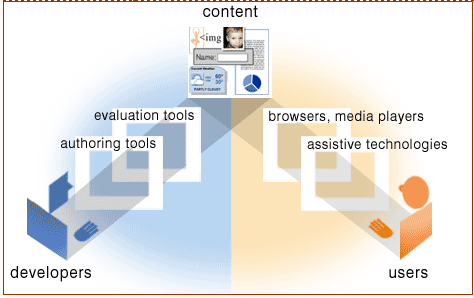


Figure 1: Components relation [5].

This picture show how a web application accomplished with the accessibility. In the case of the developers their principal activities are the correctly audit and the probes of the application. They have to be sure that the problem that they are trying is resolved. If the content is correctly the customer can use it by any assistive technologies and browser.

# JAVASCRIPT

JavaScript is an interpreted programming language, dialect of the ECMAScript standard. It is defined as object-oriented, prototype-based, imperative, weakly typed and dynamic. It is mainly used in form client side (client-side), implemented as part of a web browser enabling improvements in user interface and dynamic web pages although there is a form of JavaScript on the server (Server-side JavaScript or SSJS). External use on the web, applications such as PDF documents, desktop applications (mostly widgets) is also significant.

JavaScript was designed with syntax similar to C, although names and conventions adopted Java programming language. However, Java and JavaScript are semantic and different purposes. All modern browsers interpret web pages embedded in JavaScript code. To interact with a Web page is the JavaScript language provides an implementation of the Document Object Model (DOM). Traditionally been using HTML web pages to perform operations and only in the context of the client application, without access to server functions. It is now widely used to send and receive

## CHARACTERISTICS [6]

The following features are common to all implementations that conform to standard ECMAScript.

### Imperative and structured

JavaScript is compatible with much of the structure of C programming (fox example: if statements, loops, switch statements, etc.). With one exception, in part C, the scope of variables reaches the block in which they were defined; however JavaScript is not compatible with this, since the scope of the variables is the function in which they were declared. This changes with the version of JavaScript 1.7, and adds support block scoping through the keyword let. As in C, JavaScript makes no distinction between expressions and statements.

### Dynamic

Dynamic typing, as in most scripting languages, the type is associated with the value, not the variable. For example, a variable x at a given time may be linked to a number and later, relegated to a string. JavaScript is compatible with several ways to check the type of an object, including duck typing. One way to know is through keyword typeof.

Objetual, JavaScript is composed almost entirely of objects. JavaScript objects are associative arrays, improved with the inclusion of prototypes. The names of the properties of objects are string keys: object. x = 10 and object [ 'x'] = 10 are equivalent, the dot notation being syntactic sugar. The properties and their values can be created, changed or deleted at runtime. Most properties of an object (and those that are included by the prototypical inheritance chain) can be listed by the instruction loop. JavaScript has a small number of predefined objects such as Function and Date.

Evaluation runtime, JavaScript includes the *eval* function that allows evaluate expressions as expressed as strings at runtime. It is therefore recommended that *eval* is used with caution and that chooses to use the JSON.parse () function as far as possible, because it is much safer.

### Functional

First class functions. The functions are often called first-class citizens. They are objects themselves. As such, they possess properties and methods, as .call () and .bind (). A nested function is a function defined inside another. This is created each time the external function is invoked. In addition, each created feature is a closure; It is the result of evaluating an area containing one or more dependent variables other external environment, including constants, local variables and arguments of the calling external function. The result of the evaluation of this closure is part of the internal state of each function object, even after the outer function completes its evaluation.

### Prototypical

Prototypes, JavaScript uses prototypes instead of classes for the use of inheritance. It is possible to emulate many of the features that provide classes in traditional object-oriented languages ​​through prototypes in JavaScript.

Functions as object constructors, the functions also behave as builders. Prefixing a call to the function with the new keyword to create a new instance of a prototype, which inherit properties and methods of the manufacturer (including properties prototype Object). ECMAScript 5 provides the Object.create method, allowing explicitly creating an instance without having to automatically inherit the prototype of Object (in ancient environments created the prototype object can appear as null). The prototype property of the constructor determines the object used for internal prototype of the new objects created. You can add new methods modifying the prototype object used as a builder. Predefined in JavaScript, like Array, or Object, builders also have prototypes that can be modified. Although this is possible is considered bad practice to modify the prototype of Object since most objects in JavaScript inherit the methods and properties of the prototype object, objects which can expect that these have not been modified.

### Other characteristics

Runtime environment, JavaScript usually depends on the environment in which it runs (for example, a web browser) to offer objects and methods by which scripts can interact with the "outside world". In fact, it depends on the environment to be able to provide the ability to include or import scripts (for example in HTML by the <script> tag). (This is not a language feature, but it is common in most implementations of JavaScript.)

Variable functions, an indefinite number of parameters can be passed to the function. The function can access them through the parameters or also through the local object arguments. The Variable functions can also be created using the .apply () method.

Functions as methods unlike many object-oriented languages, there is no distinction between the function definition and method definition. Rather, the distinction occurs during function call; a function can be called as a method. When a function is called as a method of an object, the keyword this, which is a local variable to the function, it represents the object that invoked the function.

Arrays and the literal definition of objects like many scripting languages, arrays and objects (associative arrays in other languages) they can be created with an abbreviated syntax. In fact, these literals form the basis of data JSON format.

Regular expressions, JavaScript also supports regular expressions in a similar way Perl, which provide a concise and powerful syntax for manipulating text that is more sophisticated than the built objects of type string. [7]

## Use in Web pages [8]

The most common use of JavaScript is to write functions embedded or included in HTML pages and interact with the Document Object Model (DOM or Document Object Model) of the page. Some simple examples of this application are:

1. Upload new content to the page or sending data to the server via AJAX without reloading the page.
2. Animated page elements, make them disappear, resize, move, etc.
3. Interactive content such as games and audio and video playback.
4. Validation of input values of a web form to ensure they are acceptable before being sent to the server.
5. Transmission of information on the reading habits of users and browsing activities several websites. Web pages often do to make web analytics, ad tracking, customization or for other purposes.

Since the JavaScript code can run locally on the user's browser (rather than on a remote server), the browser can respond to user actions quickly, making a more sensitive application. Moreover, the JavaScript code can detect user actions that HTML alone cannot, as keystrokes. A web browser is by far the most common host environment for JavaScript. Web browsers typically create runtime environment dependent non-native objects to represent the Document Object Model (DOM) in JavaScript. The web server is another common service environment. A web server usually expose their own JavaScript objects to represent objects HTTP request and response, a JavaScript program could then interrogate and manipulate to dynamically generate Web pages. Because JavaScript is the only language for which the most popular browsers share their support, it has become a language that many frameworks in other languages ​​compiled, even though JavaScript was not designed for such purposes. Despite the limitations inherent in its dynamic nature performance, increased speed engines JavaScript language has made this an environment for compilation surprisingly feasible. [9]

## Accessibility

On the client side JavaScript should be written both in order to improve the experiences of visitors with visual or physical disabilities, such as withholding information to avoid these visitors. Screen readers used by the blind and visually impaired can be taken into account by JavaScript so you can access and read the DOM elements on the page. The HTML code written should be as concise, and semantically rich navigable possible, whether JavaScript is executed or not. JavaScript should not be totally dependent on the browser mouse events and should be accessible to users who do not want to use the mouse (computer) to navigate or choose to use only the keyboard. There independent device events, such as on-focus and on-change are preferable in most cases. JavaScript should not be used to create confusion or disorientation to the web user. For example, modify or disable normal browser functionality, such as changing the way the button to navigate back or update event behave, are practices that are generally best avoided. Similarly, triggering events that the user can not take into account reduces the sense of control and causes unexpected user to page content changes. Often, the process of providing a complex web page accessibility the greatest degree possible, becomes a nontrivial problem where many issues are just leading the debate and to the opinion, the commitment of all to the end being necessary. However, user agents and assistive technologies for persons with disabilities are constantly evolving and new guidelines and information about the web still running.

## CSS [10]

The cascading style sheets (CSS) give you control over the presentation of Web pages. Through CSS, you can place and define precisely the appearance of the elements of a web page. A CSS can be external, internal or online on a website, and a website can use one or more of these types of CSS at a time. In general, the styles that are defined in a CSS online take precedence over those of an internal or external CSS, and an internal CSS styles take precedence over an external CSS. The rules of use of Cascading Style Sheets are simple and practically the same format for the labels used.

1. Tag: is the HTML parameter to which you will apply the style.
2. Declaration: the complete style that is going to apply the rule and is delimited by the symbols {} opening and closing.
3. Property: is the attribute to which is assigned the CSS value.
4. Value is the value of the property that will be labeled.

## Extern CSS

The external style sheets are used to apply the same styles consistently across some or all of the web pages of a website. By defining styles in one or more sheets and attach them to external websites styles, you can ensure that all web site has a consistent look. If you change a style, simply make a change (in the external CSS) and this is automatically reflected in all web pages that reference that style and CSS. External CSS files are included in .css, as global.css. The external CSS syntax is the same as that of the internal CSS (see example in the next section of this topic), except that the styles defined in external CSS are not included between tags <style>.

## Internal CSS

Internal CSS, CSS embedded sometimes called, serve to define styles only for the current website and also to replace the styles that are defined in an external CSS attached to the current web page. Internal CSS are among the <head> tags of web pages.

## Online CSS [11]

An inline style loses many of the advantages of style sheets by mixing content with presentation. It is recommended to be very careful when using this method. To use this method inline styles should be applied directly on the label. The "style" attribute can contain any CSS property.

## Bootstrap [12]

It is a framework or set of open source tools for designing Web sites and applications Code. It contains design templates with typography, forms, buttons, tables, navigation menus and other design elements based on HTML and CSS, as well as additional optional JavaScript extensions. Bootstrap has relatively incomplete for HTML5 and CSS 3 support, but is compatible with most web browsers. The basic compatibility information websites or applications are available for all devices and browsers. There is a concept of partial compatibility that makes available the basic information a website for all devices and browsers. For example, the properties introduced in CSS3 for rounded corners, gradients and shadows are used by Bootstrap despite the lack of support of old browsers. This extends the functionality of the tool, but is not required for use. Since version 2.0 also supports sensitive designs. This means that the graphic design of the page is dynamically adjusted, taking into account the characteristics of the used device (computers, tablets, mobile phones). Bootstrap is open source and available on GitHub. Developers are encouraged to participate in the project and to make their own contributions to the platform.

### Structure and Function [13]

Bootstrap is modular and consists essentially of a series of style sheets that implement LESS variety of tool components. A style sheet called *bootstrap.less* includes the components of style sheets. Developers can adapt the same Bootstrap file, selecting the components they want to use in your project. The adjustments are possible to a limited extent through a central style sheet configuration. The most profound changes are possible by the LESS statements. The use of sheet language LESS style allows use of variables, functions and operators, nested selectors and a mix of classes. Since version 2.0, Bootstrap configuration also has a special option "Customize" in the documentation. Moreover, developers choose components on a form and desired settings, and if necessary, the values ​​of various options to your needs. Consequently generated package already includes the pre-compiled sheet CSS style.

1. Gang system and responsive design: Bootstrap comes with a standard arrangement gang 940 pixel wide. Alternatively, the developer can use a variable-width design. In both cases, the tool has four variations to make use of different resolutions and types of devices: mobile phones, portrait and landscape format, tablets and computers with low and high resolution (widescreen). This adjusts the width of the columns automatically.
2. Understanding CSS style sheet: Bootstrap provides a set of stylesheets that provide basic definitions of style for all components of HTML. This gives uniformity to the browser and system wide, gives a modern look for formatting text elements, tables and forms.
3. Reusable components: In addition to regular HTML elements, Bootstrap contains other commonly used interface elements. This includes buttons with advanced features (eg group of buttons or buttons with drop-down menu option, navigation lists, horizontal and vertical labels, route navigation, paging, etc.), labels, advanced typographic capabilities thumbnails, formatting for messages alert and progress bars.
4. Plug-ins JavaScript: JavaScript components for Bootstrap are based on the jQuery JavaScript library. The plug-ins is in the tool plug-in of jQuery. Provide additional user interface elements such as dialogs, tooltips and carousels. Also extend the functionality of existing interface elements, including for example an auto-complete for input fields (input).

### Use [13]

To use Bootstrap in an HTML page, the developer must only download the Bootstrap CSS stylesheet and link in the HTML file. Another option would be to compile the CSS file from LESS style sheet discharged. This can be done with a special compiler. If the developer also wants to use JavaScript components, they must be referenced with the library jQuery in the HTML document. The following example illustrates how it works. The HTML code defines a simple search form and a list of results in a tabular form. The page consists of regular and semantic elements of HTML 5, and some additional information CSS class according to the Bootstrap documentation.

## MYSQL

It is a management system relational database developed under dual GPL / commercial license for Oracle Corporation, and is considered the most popular database open source world, and one of the most popular general with Oracle and Microsoft SQL Server , especially for development environments. MySQL is a very fast data reading when using the non-transactional MyISAM engine but can cause integrity problems in high concurrency environments in the modification. Web applications there is low turnout in modifying data and change the environment is intensive reading data, which makes ideal for such applications MySQL. Whatever the environment in which you will use MySQL, it is important to monitor the performance beforehand to detect and correct errors of both SQL and programming.

Initially, MySQL lacked elements considered essential in relational databases, such as referential integrity and transaction data. Nevertheless, he attracted developer’s web pages with dynamic content, precisely because of its simplicity. MySQL is a management system databases. A database is a structured collection of tables containing data.

Gradually the elements that are being incorporated MySQL lacked both internal developments as free software developers. Among the features available in the latest versions can highlight is a large subset of the SQL language. Some extensions are also included. Also is available for a lot of platforms and systems. It provides the possibility of selection of storage mechanisms that offer different operating speeds, hardware, capacity, geographic distribution, transactions, etc. In addition to transactions and foreign keys, it was implemented safe connectivity, replication and search and indexing text fields.

This can be anything from a simple shopping list to a picture gallery or the vast amounts of information in a corporate network. To add, access and process data stored on a computer, you need an administrator as MySQL Server. Since computers are very good at handling large amounts of information, database administrators play a central role in computing, as standalone applications or as part of other applications. MySQL is a system relational database management. A relational database archive data in separate tables rather than putting all the data in a large file. This allows speed and flexibility. The tables are linked by defined relations that make it possible to combine data from different tables on request.

## ECLIPSE

Eclipse is an integrated development environment open source, is used in computer programming. Eclipse is written in Java ant its primary use is for developing Java Applications. This platform has an EPL License that is to say Eclipse Public License. Also, Eclipse is developed by Eclipse Foundation which is a nonprofit foundation.

## ANGULAR

Angular is a JavaScript framework of web development which provides apply functionalities from client (front-end), that is to say, all about what the user sees. It can be added to an HTML page with a <script> tag. AngularJS extends HTML attributes with directives and binds data to HTML with expressions.

AngularJS use MVC (Model View Controller) scheme, this scheme is per layers which allow separate client and application functionalities. That reduces response time from the controller.

## ANGULAR NGROUTE

Angular ngRoute is a Library that is on Github Repository. This is a framework which provide a special functionality to the application. The ngRoute module provides routing, deeplinking services and directives for angular apps. In HTML index, it’s necessary to import library angular-route.min.js and add dependency on module of angular.

## ANGULAR HTML2CANVAS

The script allows to take "screenshots" of webpages or parts of it, directly on the user’s browser. The screenshot is based on the DOM and as such may not be 100% accurate to the real representation as it does not make an actual screenshot, but builds the screenshot based on the information available on the page.

## ANGULAR UI-BOOTSTRAP

This is a library from angular and it allows to do dynamic styles on angular applications. You must import the library with tag script. After that, it’s necessary to include in app.js on the dependencies the framework, writing ui.bootstrap. The form to use these dynamic styles is using the attribute ng-style on input, select, textarea in forms.

## ANGULAR JSPDF

This is a library from angular and it allows to create a PDF file on an application. You have to include the library on HTML files where you want to print a PDF file. The form to use this framework is, in angular controllers, creating a variable like jsPDF and it provides some functions to take a specific part of HTML file in a PDF file.

## WEB SERVICES (REST)

Web services provide functions in web applications. Angular allows to use web services with the object $http. It can be used only writing path, method and json object or parameters in a function.

## EXAMINATOR

It is an online service to automatically assess the accessibility of a web page, using as a reference some recommended Accessibility Guidelines for Web Content 2.0 (WCAG 2.0) techniques. Score on our application SRD has been 7 on August 08, 2016. Next image (figure 2) can show test on examinator:

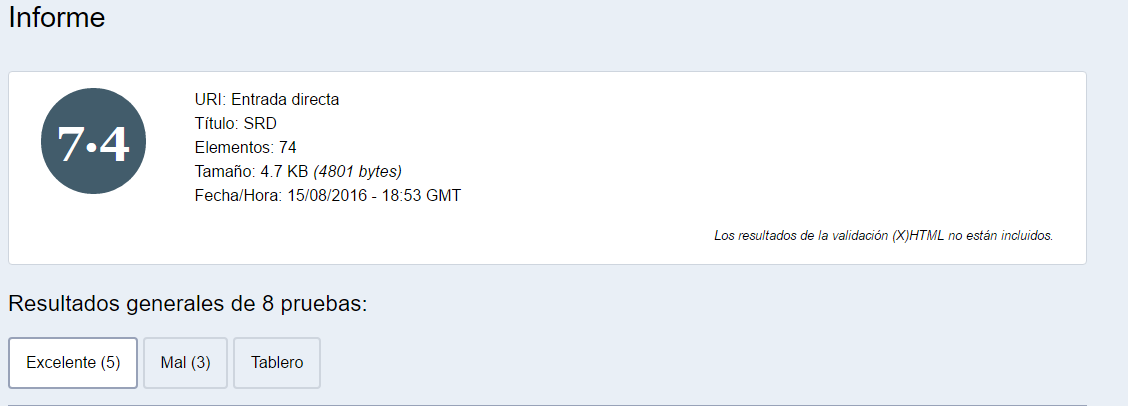


Figure 2: Examinator test

On August 15, 2016 score was 10. Next image (figure 3) can show test on examinator:

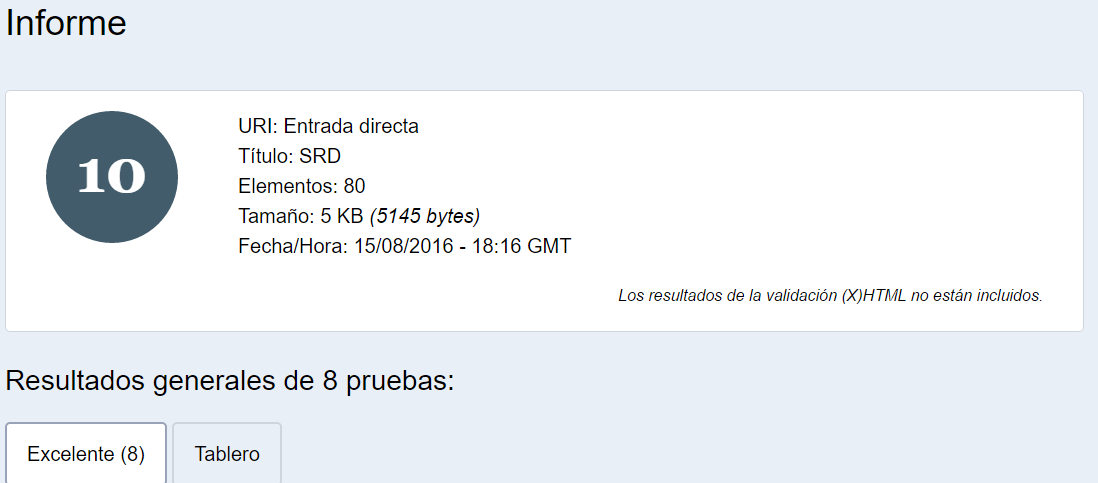


Figure 3: Examinator test.

## REQUIREMENTS ANALYSIS

Concerning the Requirements Analysis was obtained the following information.

* An interface that allows for information query, within a table of requests by identity card or by last name. The query result is displayed in a data table. If the query no returns results, the message is: "No records are related try another parameter"

The table must have columns of data showing the query: Identity Card, Last Name, First Name, Application Date and State.

* As well as an interface for Registration Request which is a CRUD form with 12 fields. 10 of which are visible and 2 are stored programming.
  + Field 1 must go through a validation check digit.
  + Fields 2 and 3 should allow only enter capital letters.
  + Field 4 and 5 are drop-down lists. The catalog Field 4 has 3 options:
    - ESMERALDAS
    - MANABÍ
    - LOS RÍOS
  + While the catalog the field 5 must be at least 15 cities.
  + Field 6 has 2 options: H Male, M Female.
  + Field 7 is date type. The year may not be less than 1930 and cannot be greater than 2000.
  + Field 10 must allow only numbers.
  + The application date field will be saved with the creation date of the application.
  + The state field of Request is saved with the status: 'S'
  + Requests, with already registered card, aren't allowed.

Creating tables is optional for catalogs. In queries and reports are enough codes.

Interface type Approval Request search by date range.

* + The query should return a list of requests filtered by 2 parameters: date of application within range and state = 'S'. In the listing Request must exist the possibility to update the record with 2 options. Approve ('A'), Reject ('R').
  + Before updating the record should be a confirmation message.

## CONCLUSION

Web applications must be designed to be accessible for every person independent of their visual deficient, in this case color blindness.

Through a process of analysis and design, which includes an investigation and the use of algorithms, people can create applications that are functional for all kinds of people.

Application is too necessary by earthquake in Ecuador on April 16, 2016. It can help to register how many people need to be aided and have been affected by disaster.

## RECOMMENDATIONS

Web applications can be done with angular which is a framework that can provide facilities to develop dynamic web page.

Web applications must be developed with options to help disabled people, because there are a lot of people who can have a disability and need a help to use web application.

It’s difficult to do an accessible page if, it includes a lot of solutions for disabled people, because each disability needs a different design and can cause problems to accessibility in web applications

# ACKNOWLEDGMENTS

Our thanks to Github Repository that allows us to find and edit libraries to develop our dynamic web page SRD.

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