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Web Development Final Report

SInce no lab was open or present to have server running when it was mentioned in the meeting that there would be. I created a free hosting server on Render.com. The server will take upto 1 min to load the first time(since it is free), then it will run smoothly .Endpoints will be different due to different server, but locally will be the same.
Application in : https://uae-internet-history.onrender.com .

A.Background Research

The country to be covered is where I live, The United Arab Emirates. Firstly I will go through my fact sheet for the timeline of events between the 1990s and the Present Time.

Fact Sheet: History of the Internet in the U.A.E :

1. Early Internet Days in the UAE (1990s - 2000s)
    - 1982- UAE launched the first mobile network in the Middle East. [1]
    - 1995 - Internet services became publicly available through Etisalat (government ISP) [2]
    - 1997- Internet services became commercially available to businesses and individuals [2]
    - The early 2000s - Broadband Services became readily available [3]
    - Challenges faced- High Costs, very low speeds and limited accessibility. Used by businesses and government services when started
2. Digital Growth in the UAE and Complete Expansion (2000s - 2010s)
    - 2006 - Increased competition arises, DU is launched as second ISP [4]
    - 2010 - UAE launches UAE Vision 2021 to digitise services in the UAE.[7]
    - 2013 - Smart Dubai Initiative, made to help with making government services digital. [3]
    - 2015- Wifi becomes available in public spaces for Etisalat Users [6]
    - 2019- Expansion of Wifi services through transportation modes like Buses by Du [5]
    - Internet Regulations - Strict web content filtering to adhere to legal and cultural compliances in the UAE [8]
3. Smart Infrastructure and the Modern Internet (2010s - Present)
    - 2019 - UAE becomes one of first few countries to launch 5G service [10]
    - 2020 - CyberSecurity Council and Law introduced to strengthen online data protection [10]
    - Block Chain, AI, and IoT become part of government initiatives to make a Smart City [3] [10]
    - 2022 - UAE announces part of UAE Vision to work on a Digital Economy Strategy [9]

Images and Videos to be included as follows:

For the three sections mentioned above and a home page (overview), it will be as follows:

- Home Page (Overview):
    - Early ISP picture:
        - Etisalat journey: Etisalat_fig.jpg
        - Etisalat Building: First Building.jpg https://www.telecomreview.com/articles/telecom-operators/5616-etisalat-group-to-buy-elgrocer-to-offer-diversified-digital-services

        - Du Building: Du_First_Building.jpg https://www.itp.net/commsmea/network-infrastructure/596986-du-to-create-public-wi-fi-hotspots-for-uae
    - Digital Transformations overtime :
        - Gitex_2018.jpg (https://www.dwtc.com/en/press/gitex-technology-week-gitex-future-stars-2018-to-throw-open-the-door-to-the-digital-world-of-tomorrow-2018/)
        - Sharjah_Goverment_Gitex.jpg (https://www.eyeofdubai.ae/news/details/sharjah-government-showcases-innovative-tech-services-and-solutions-at-gitex-2018)

    - Some Smart City initiatives of Dubai:
        - Dubai_Smart_City.jpg (https://www.sheridanuae.com/the-rise-of-smart-cities-in-the-uae-and-its-impact-on-the-construction-industry/)
- Section 1 (1990's - 2000's):
    - First WebPages in UAE :
        - Gulf_News_Website.jpg https://gulfnews.com/uae/a-history-of-the-internet-1.250454
        - Broadband_Services.jpg https://www.etisalat.ae/en/c/mobile/mobile-internet.html
- Section 2 (2000s - 2010s):
    - Digital Transformation:
        - Middle_East_Businesses.jpg https://nmsconsulting.com/digital-transformation-accelerating-in-the-middle-east/
    - WiFI Revolution:
        - Bus_WiFi.jpg https://www.thenationalnews.com/uae/2023/12/15/free-public-wi-fi-launched-in-abu-dhabi/
    - Interview of Smart Dubai Initiative with CEO of Smart Dubai Establishment:
        - Smart_Dubai_CEO_interview_vid https://www.youtube.com/watch?v=mlU375EWB4I
- Section 3 (2010s - Present)
    - Dubai Tech Hub Futuristic Images.
        - Dubais-journey-to-becoming-a-tech-hub-The-milestones-and-the-ambitions-2.jpg https://seedgroup.com/2022/09/dubais-journey-to-becoming-a-tech-hub-the-milestones-and-the-ambitions/
        - Dubai-Urban-Tech-Hub.jpg https://www.industryleadersmagazine.com/dubais-urban-tech-district-a-sustainable-laboratory/
    - Smart City Initiative brief overview 2018:
        - Smart Dubai
        - Digital_Economy_Growth.jpg https://www.thenationalnews.com/business/technology/2023/08/30/mi

ddle-easts-digital-economy-to-hit-780bn-by-2030-and-outpace-global-growth/

References:

1. *Etisalat*. (2019, November). *Born in the UAE.* http://www.bornintheuae.ae/products-and-services/etisalat.php
2. *Over Four Decades of Evolution in the Telecom Sector - Industry Thought Leadership*. (2020, July). SAMENA Telecommunications Council. https://www.samenacouncil.org/thought-leadership-read?id=161
3. *Silicon Sands: A Timeline of Dubai's IT Transformation*. (2023, February). Cloud Technologies. https://www.cloudtechnologies.ae/blog/silicon-sands-a-timeline-of-dubais-it-transformation/
4. *Who we are | About us | du™*. (2006, April). Du. https://www.du.ae/who-we-are
5. *Free Wifi offered in public transport buses in UAE* (2019, September). Gulf Today. https://www.gulftoday.ae/News/2019/09/09/Fee-WiFi-offered-on-public-transport-buses-in-Abu-Dhabi
6. *High-speed public wifi launched nationwide, free for Etisalat data user* (2015, November). Emirates New Agency - WAM. https://www.wam.ae/en/article/hszi6cad-high-speed-public-wifi-launched-nationwide-free
7. *Vision 2021*,(July 2010). UAEhttps://u.ae/en/about-the-uae/strategies-initiatives-and-awards/strategies-plans-and-visions/strategies-plans-and-visions-untill-2021/vision-2021
8. *Internet Filtering in the United Arab Emirates* , (June, 1998), OpenNet Initiative https://opennet.net/studies/uae#toc2e
9. *Digital Economy* (February 2022), UAE ffefehttps://u.ae/en/about-the-uae/economy/digital-economy
10. *Digital and Information Communication Technology* (November 2023), International Trade Administration.

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https://www.trade.gov/country-commercial-guides/united-arab-emirates-digital-and-information-communication-technology-ict

B.Planning

Website Layout plan :

Plan	Content
Home Page	**Introduce the history of the internet in the UAE and, key events and a main overview**
Early Internet Breakthroughs (1990s - 2000s)	**Information on internet introduction, Etisalat's Role in creation, first commercial ISP being launched**
Slow Expansion and Digital Growth (2000s - 2010s)	**Competitors like Du introduced, UAE vision details, complete widespread of the internet,**
Modernt Internet and the Future to come (2010s - Present)	**5G launch, Smart City details, Cybersecurity laws, the rise of AI, IoT, Digital Services for easy accessibility**

Development Approach (Agile Methodology applied) :
Split into 4 sprints going over two weeks (two sprints in a week) :

- Sprint 1 - Topic Research and Main Content Writing.
- Sprint 2 - Front-End Coding Development (HTML, CSS and Javascript).
- Sprint 3 - JSON Data Integration (to render).
- Sprint 4 - Testing and Optimization of the content.

C.Development Process: Prototype Designs

Attached below is the pdf version of the wireframe designs for each page mobile and desktop versions respectively:
Website-Wireframe.pdf
Once the wireframe was made, I had made a questionnaire using google forms to gain some feedback from a few family members. Here are my results.
Questionnaire Used : Website_Wireframe_Questionnaire
The Form has a total of 5 questions to get an engagement of how the wireframe was structured and what could have been changed. I have received responses on each question but one question gave feedback to proceed with improvements.The results were as follows:

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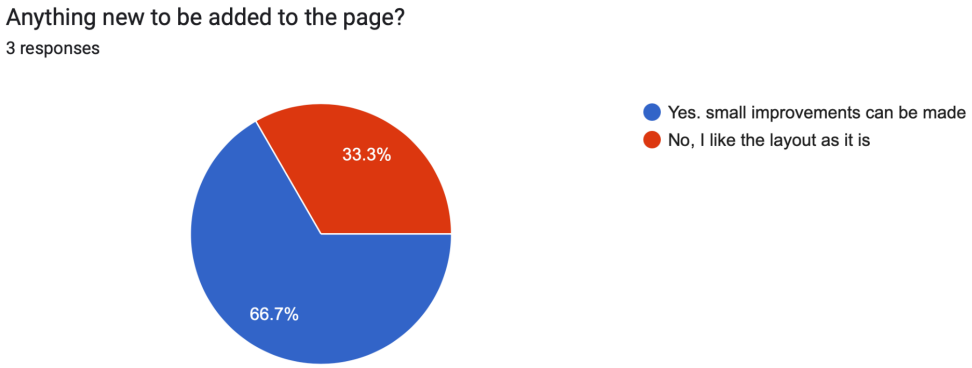
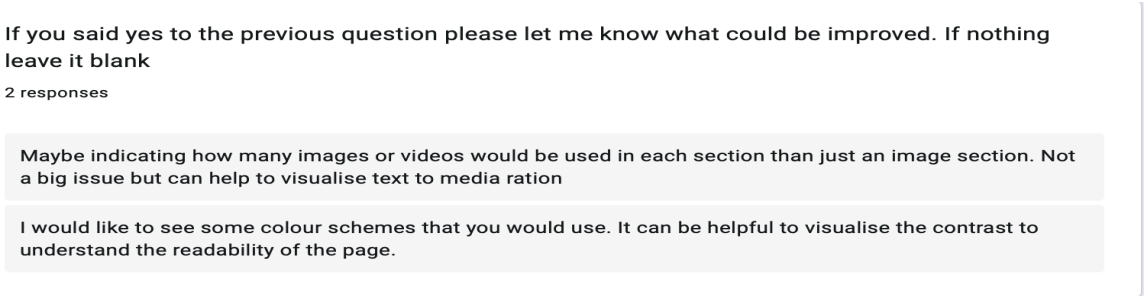


So the results from the feedback was :



With this in mind, I plan to incorporate the flag colors to design the color schemes to be used being black and white (there is also green and red) . I plan to also keep in mind that the ratio of media is appropriate to the text so each piece has some context to explain it accordingly.

D. Development Process: Developing the Code

The development process was done in a structured way. I have made a tree-like structure to divide the layout into necessary files. My structure is as follows:

```
/final_project
|— /public
|   |— /css
|   |   ├— styles.css        # Main CSS file
|   |— /images               # Stored media files (being images and videos)
|— /views
|   |— /partials
|       |— footer.ejs        #The Generic file template file to illustrate the
footer section
|       |— header.ejs        #The Generic file template file to illustrate the
header section
|       |— head.ejs          #The Generic file template file to illustrate the
head section
|   |— home.ejs              # Main home file for overview
|   |— pageOne.ejs           # First page on Early ISPs page
|   |— pageTwo.ejs           # Second page on Digital Growth
|   |— pageThree.ejs         # Third page on Modern Internet
|— /data
|   |— data.json             # JSON data file
|— /routes
```

```
|   |── index.js              # Route handling for all the pages
|── /controllers
|   |── dataController.js     # Handle API Data  fetching & Validation for a more
structured and cleaner look
|── server.js                 # Main Node.js/Express server file
|── package.json              # Project dependencies & scripts
|── README.md                 # Project documentation
```

How the Code Works and Connections Between Files:
The project follows a structured approach to develop a dynamic website using Node.js, Express, EJS(template engine), and JSON(api data). The primary function of the application is to serve static pages (home, pageOne, pageTwo, pageThree) using server-side rendering. The connection between the files can be explained as follows:

- Server Setup (server.js): This is the entry point for the application. It sets up the Express server, handles routing, and renders views. The server listens on a specified port and sends requests to appropriate routes for different pages like home, pageOne, pageTwo, and pageThree.
- Routing (/routes/index.js): The index.js file handles the routes of the application. Each route corresponds to a specific page and renders the relevant EJS template (e.g., home.ejs, pageOne.ejs). The routes also fetch the data from the data.json file using the dataController.js.
- Data Controller (/controllers/dataController.js): This file is responsible for fetching data from the data.json file. The data is then passed to the EJS templates for dynamic rendering. It also organizes the data structure for each page (home, pageOne, pageTwo, pageThree) and manages the validation process.
- Templates (/views/): The templates (e.g., home.ejs, pageOne.ejs, etc.) are responsible for displaying the dynamic content on the webpage. These templates use the data sent from the dataController.js and render the content accordingly. They include common sections like the header, footer, and head, which are rendered using the partials folder.
- Public Folder (/public/): Contains static files like CSS and images that are linked to the EJS templates. The CSS file is used to style the pages, while images and videos are displayed dynamically through the JSON data. This modular setup helps keep the code clean, with clear separation of concerns between data fetching, rendering views, and handling routes

E.Testing: Code Validation reports and actions taken

The validation process in this project ensures that the data fetched from the data.json file meets the required structure before rendering it to the web pages. The validation function checks whether essential fields are present and correctly structured, such as ensuring that arrays are used where expected (e.g., timeline, content, features). This helps prevent issues like missing data or incorrect formatting, which could lead to runtime errors or incorrect rendering of the page.An example of data entered incorrectly or not present.

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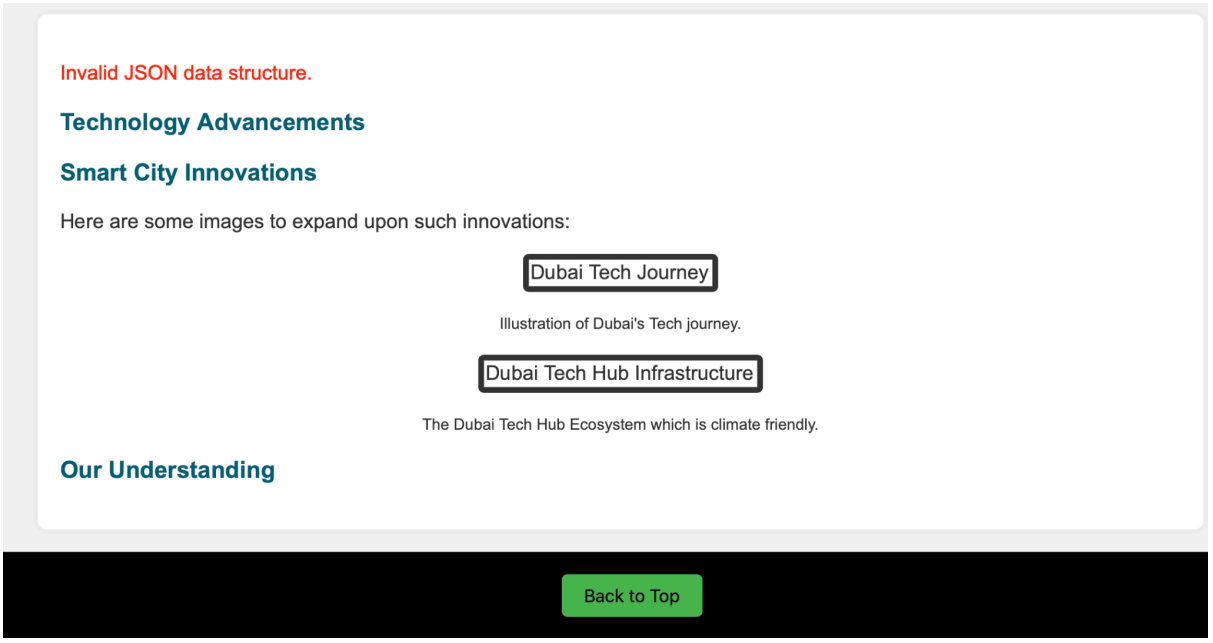

The other validation and accessibility were done with two methods:

1. HTML Validation
2. Accessibility Testing

1. HTML Validation:

To test the HTML, I would have to start the server, load the web pages and get the page source. I would then paste their content into W3C Validation Service where I could validate with direct input sections. The results were as follows:

home.ejs:

This Error occurred for every single figure picture present in the file, which was 6.
The solution was to wrap the <figure> tag inside a list <li> to fix the issue. The result in the validator looked like this:

```
<li class="no-bullets">
<figure>
    <img src="/images/first_building.jpg" alt="First ISP Etisalat Building created.">
    <figcaption>First ISP Etisalat Building in the UAE.</figcaption>
</figure>
</li>
```

No bullets class was to give the effect of an image placed within a list.
Once all these errors were fixed. Resulted in success message:

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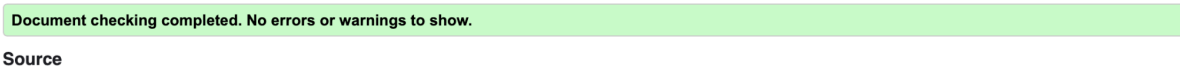
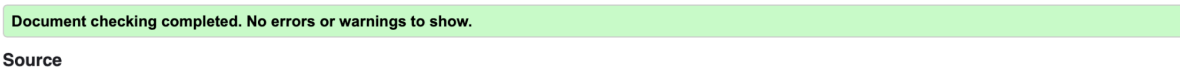


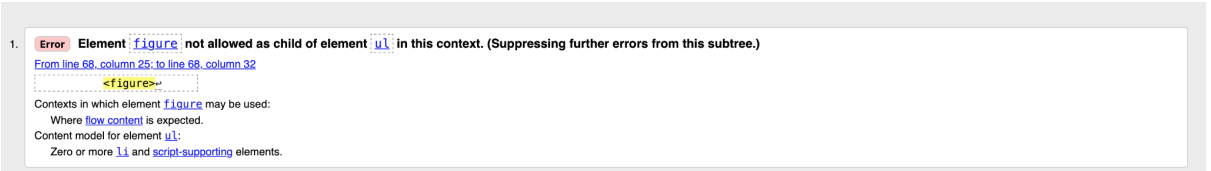
pageOne.ejs:

No errors present:

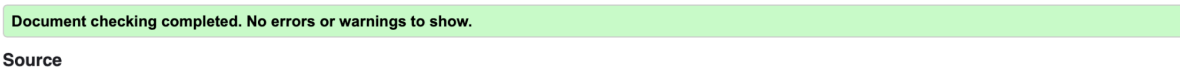


pageTwo.ejs:

The same error occurs with Figure above:

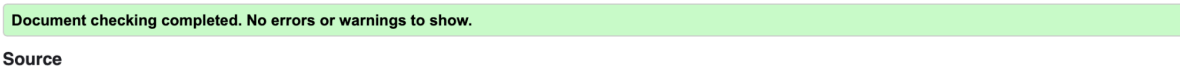


The fix was the same as above then resulted in success:



pageThree.ejs:

No errors present:



2. Accessibility:

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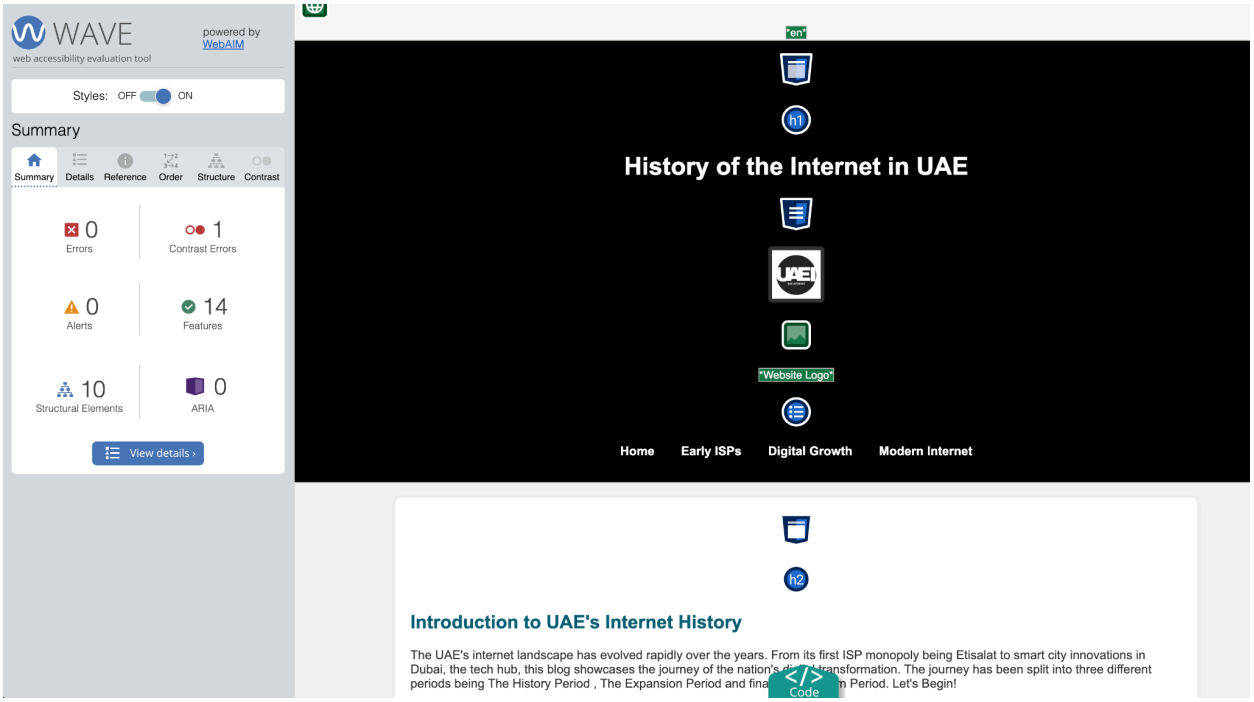
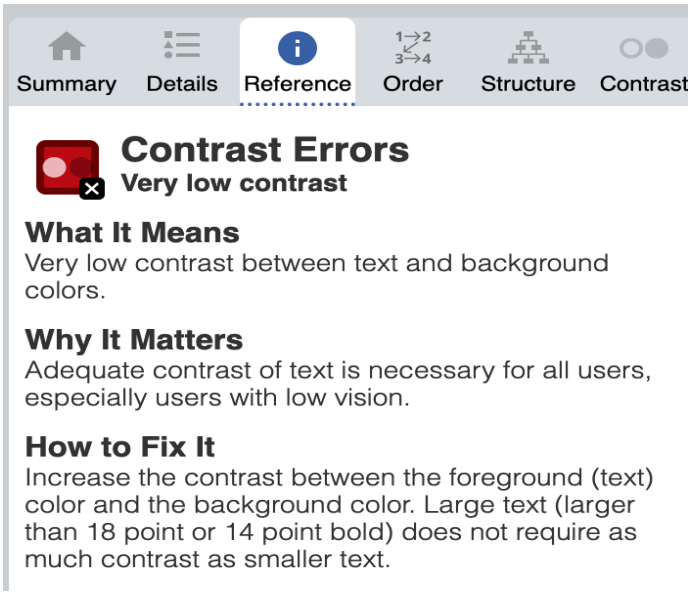
WAVE Browser extension was used to fix any issues to do with accessibility:

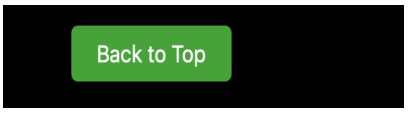


The Issue was as follows:



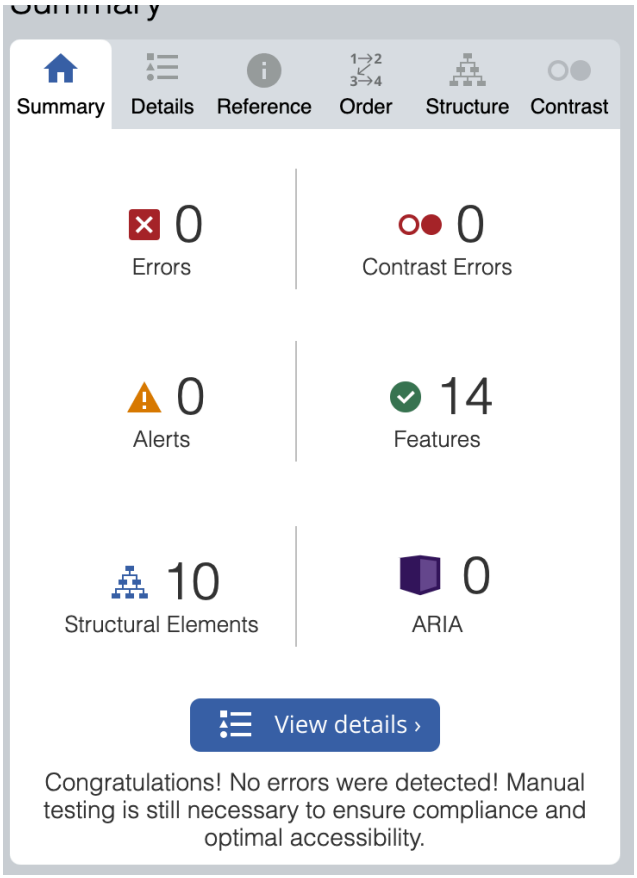
FIx and issue was related to the colour scheme of the footer button:

Before :



After:

Then accessibility was checked again resulting in:



Leading to successful accessibility testing for the page.

F. Reflections on what you learned

This project has been a great learning experience, particularly in understanding server-side rendering and web accessibility. Before starting, I had limited knowledge about how the server interacts with data and how dynamic content is rendered on the client-side. Through building this project, I learned how to use Express.js to serve dynamic content via EJS templates, and how server-side logic can control the flow of data to the client with correct validation tests. I also gained a better understanding of accessibility principles, such as making sure content is readable and usable for all users, including those with disabilities. These lessons have significantly enhanced my ability to build functional and inclusive websites. I have learned that not everything can go to plan with the wireframe designs, due to time constraints or understanding design principles. Some of my designs were different from the wireframe and final project and better layout were found for better data structuring. I learned that I must adapt when possible for better results.