Lecture/Tutorial/Laboratory 04 (SDL)

Web Validation and Accessibility Testing

1. LEARNING OUTCOMES

Upon completion of this lesson, you should be able to:

- Validate HTML content using the W3C Markup Validation Service.
- Evaluate the accessibility of a website using the axe accessibility testing toolkit.

2. REQUIRED SOFTWARE

- Apache NetBeans 11.2 (or later): https://netbeans.apache.org/download/index.html
- FireFox (https://www.mozilla.org/en-US/firefox/new/) or Chrome (https://www.google.com/chrome/) web browser.
- W3C Markup Validation Service: https://validator.w3.org/
- Deque's axe accessibility testing plugin
  - Firefox: https://addons.mozilla.org/en-US/firefox/addon/axe-devtools/
  - Chrome: https://chrome.google.com/webstore/detail/axe-web-accessibility-tes/lhdoppojpmngadmnindnejefpokejbdd

3. INSTRUCTIONS

3.1 This document combines the Lecture, Tutorial and Laboratory for Week 4, and is to be completed on your own via self-directed learning (SDL).

3.2 Study the reference materials and online resources, then complete the exercises as instructed. Take note that you will be responsible for knowing this material for the Quiz/Exam. Additionally, you must submit your work to xSiTe in order to receive credit for the assignment.

4. STUDY REFERENCES

4.1 Study the topics on W3C under **Introduction to Standards-Based Design**, especially the use of W3C's HTML validator: https://www.w3.org/standards/about.html#started.

4.2 Review the **Standards FAQ** at: https://www.w3.org/standards/faq.html.

4.3 Study **Introduction to Web Accessibility**: https://www.w3.org/WAI/fundamentals/accessibility-intro/.

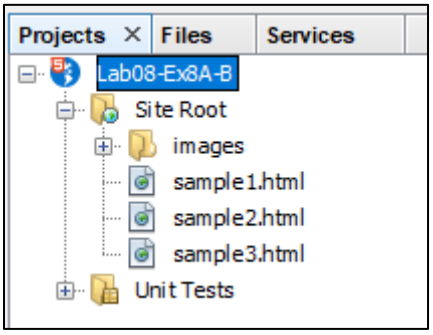
4.4 Study the Web Content Accessibility Guidelines (WCAG): https://www.w3.org/WAI/standards-guidelines/wcag/. In particular, **be sure** you know the four principles of WCAG, represented by the acronym POUR.

5. LAB EXERCISES - INITIAL SETUP

5.1 Perform the following steps first before completing the exercises:

a. Create a new HTML5 project in NetBeans. You can delete the default 'index.html' that's auto-generated, you will not need this file.

b. Download the file "Lab04-Sample-Files.zip" from xSiTe and unzip the contents into the 'public_html' folder (Site Root) of your newly created NetBeans project. Your project contents should look like this:



c. Install the **axe** plugin using one of the links provided in section 2. The examples are shown in Firefox, but you are welcome to use Chrome if you prefer.

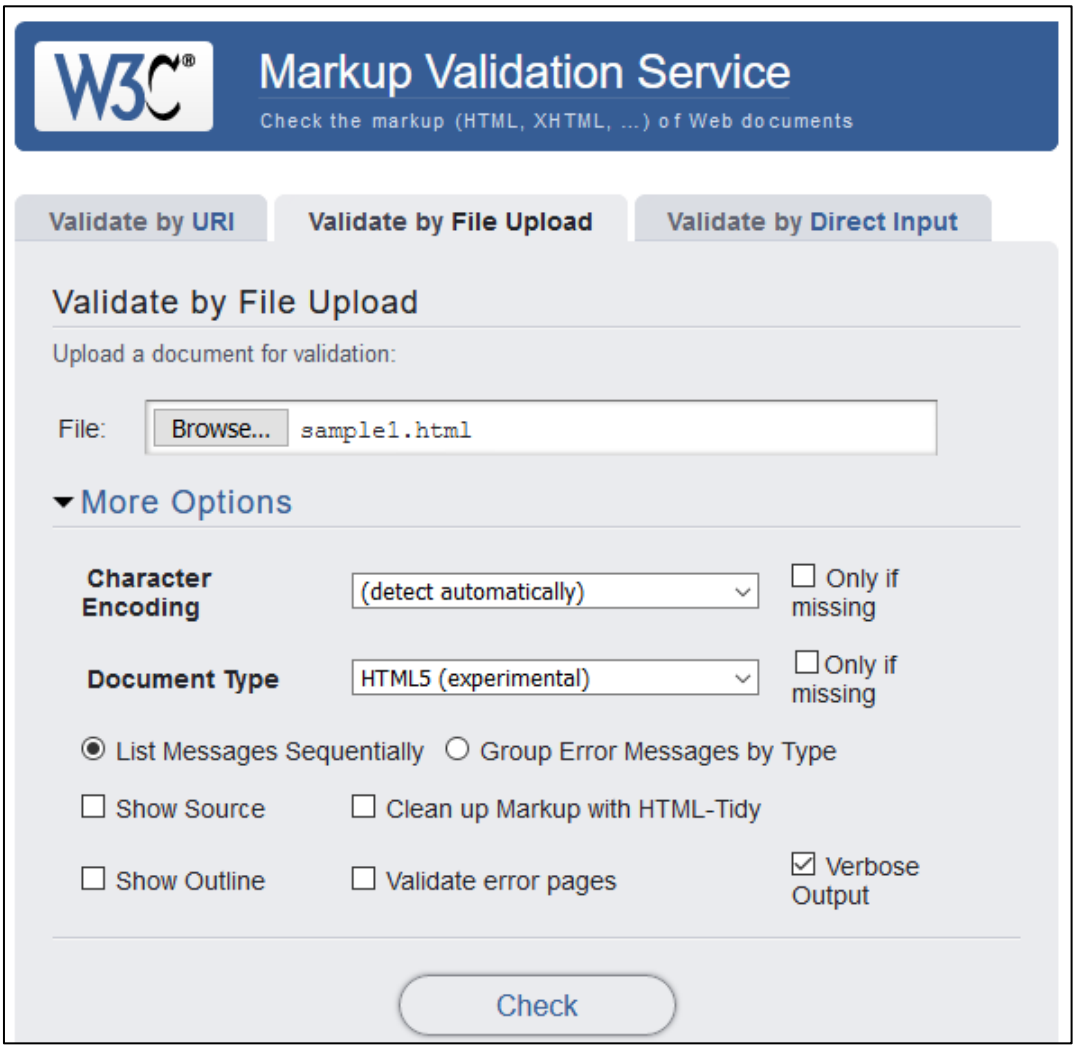
6. EXERCISE 1: WEB VALIDATION

6.1 Let's get some hands-on experience using the W3C Markup Validation Service. Navigate to https://validator.w3.org/ and observe the three tabs:

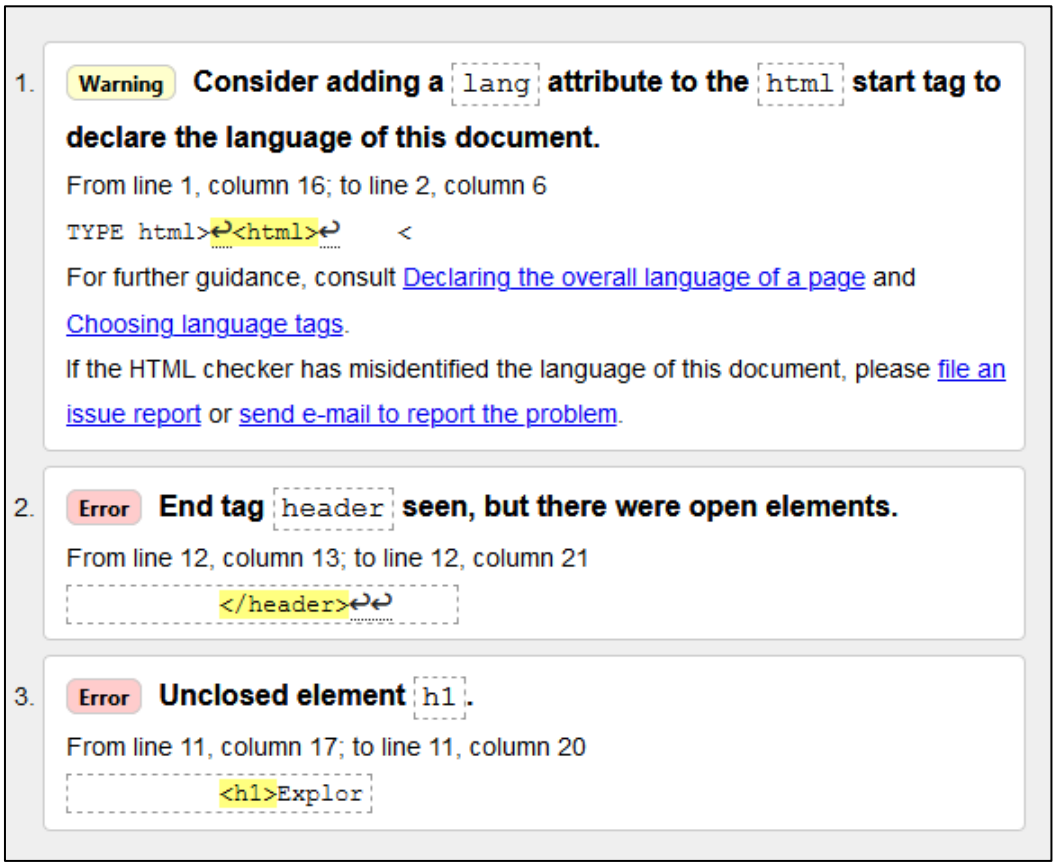
- **Validate by URI** - allows you to validate any publicly available web page online. For example, try typing www.singaporetech.edu.sg in the 'Address' box and hit the 'Check' button. You may see some interesting results!
- **Validate by File Upload** - allows you to upload a HTML document from your local file system and perform validation. This is the method we'll use in the exercise.
- **Validate by Direct Input** - allows you to type or paste HTML content directly in the editor and perform validation.

6.2 Go to the 'Validate by File Upload' tab. Click the 'Browse…' button, navigate to the public_html folder in the NetBeans project you created in 3.1, and select 'sample1.html' as the input file.

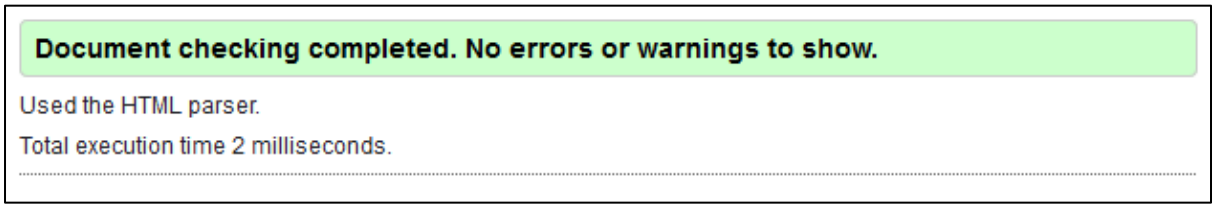
Expand the 'More Options' panel and select "HTML5 (experimental)" as the document type. Lastly, check the 'Verbose Output' checkbox to get more explanatory output:



6.3 Click the 'Check' button and observe the results. The validator should indicate 1 warning and 2 errors:



6.4 Edit 'sample1.html' in NetBeans and fix all of the problems. Run the file through the validator again to check that there are no errors:



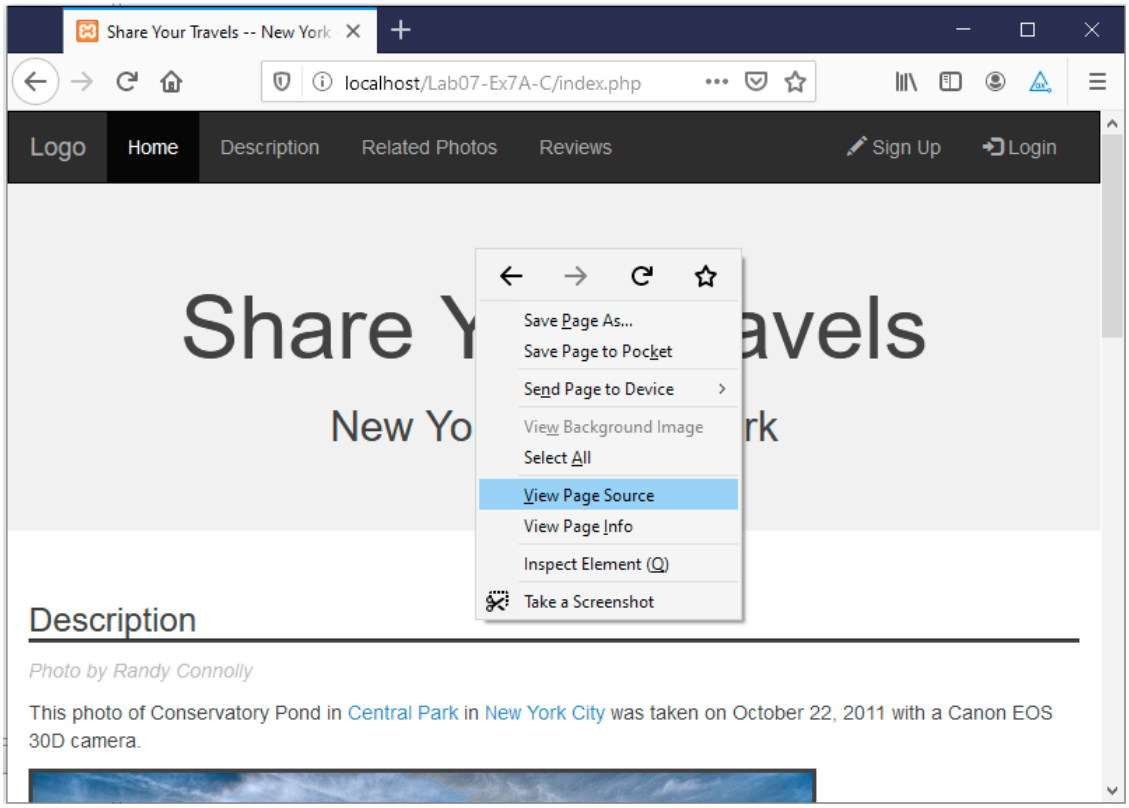
6.5 Now repeat the above steps with 'sample2.html' and then 'sample3.html' as the input files. Fix all errors in both files and verify that the updated files pass validation.

7. HOW TO VALIDATE PHP FILES

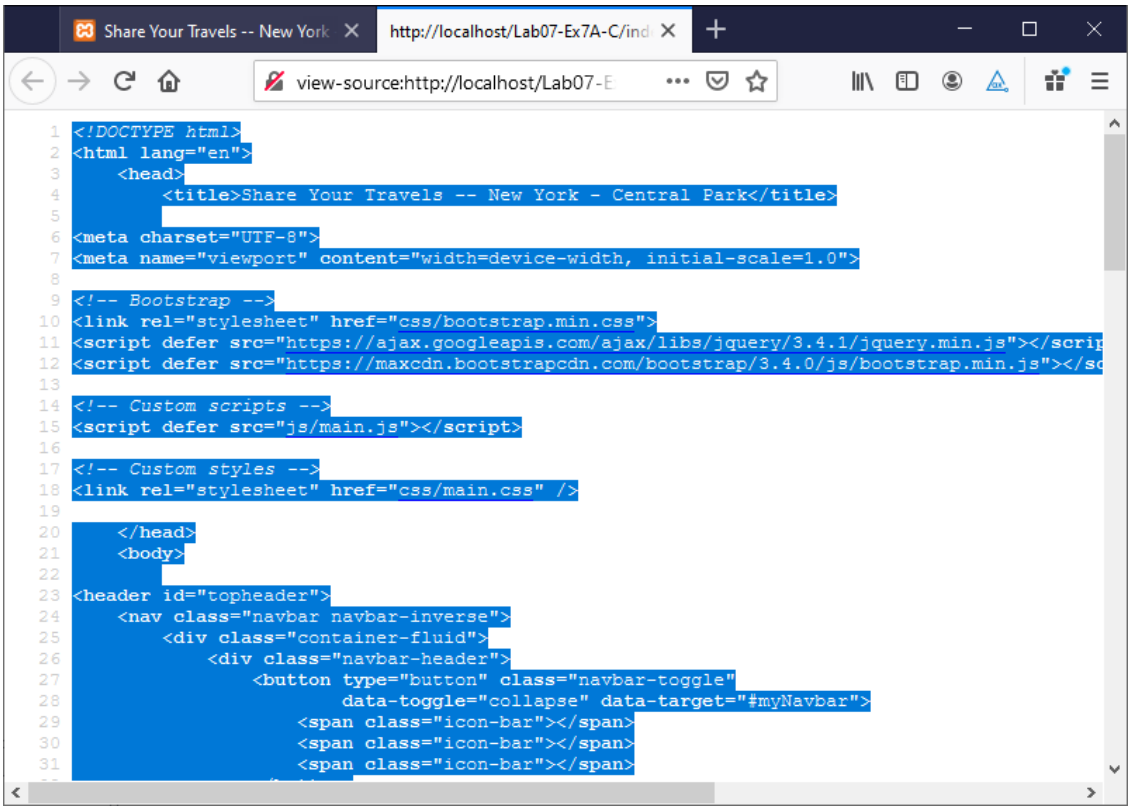
7.1 Note that PHP source files **cannot** be uploaded to the W3C Markup Validation Service directly, as we did with the HTML files above. Instead you must use either the 'Validate by URI' method, if your website is publicly accessible, or the 'Validate by Direct Input' method, if your website is running on localhost. To use the latter method, you would:

a. Run the PHP page on localhost to generate a pure HTML page in the browser.

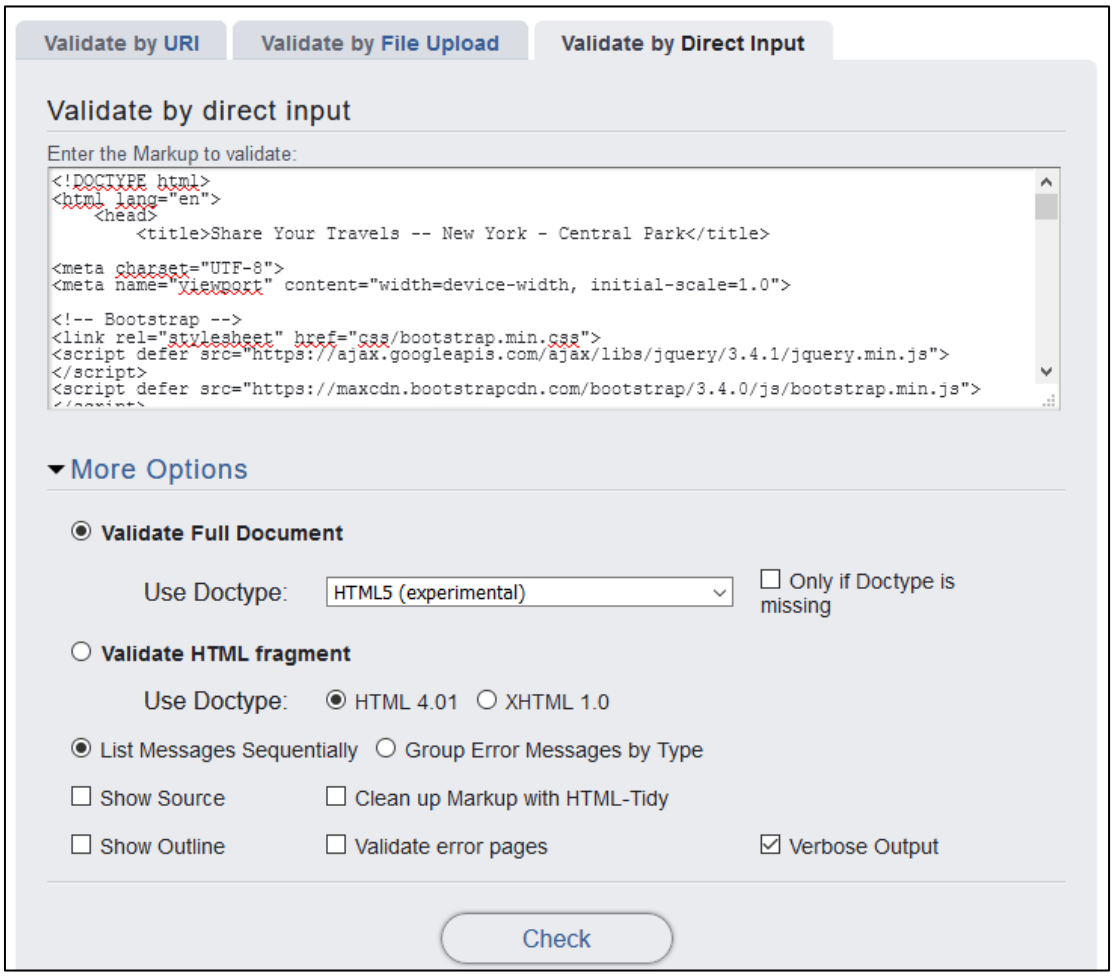
b. Right-click on the page and select 'View Page Source' from the popup menu:



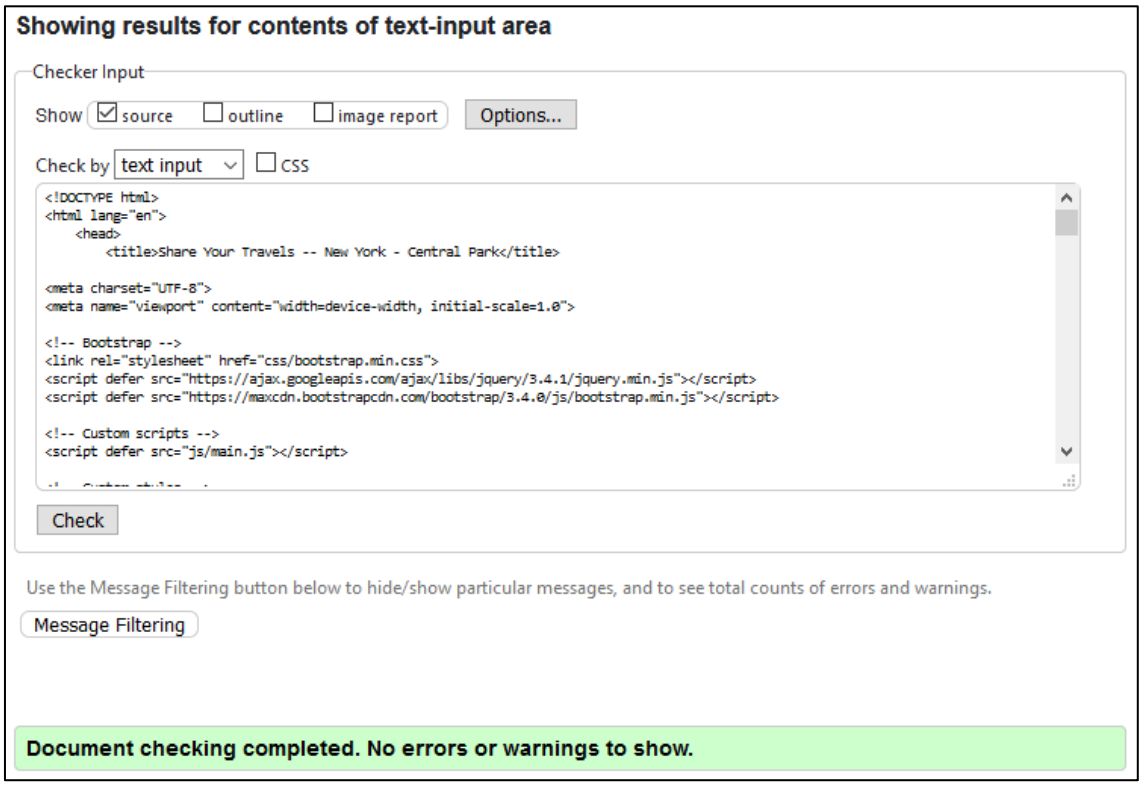
c. Select all of the HTML code in the source view (CTRL-A) and copy to the clipboard (CTRL-C):



d. Go to the 'Validate by Direct Input' tab in the W3C Markup Validation Service and paste (CTRL-V) the content into the editor:



e. Click 'Check' to perform the validation and view the results:

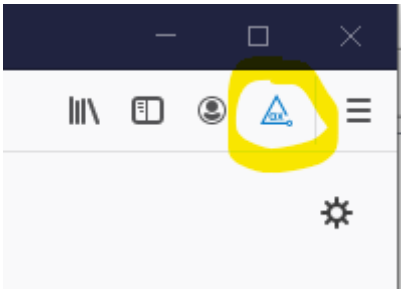


8. EXERCISE 2: ACCESSIBILITY TESTING

8.1 The validation tests performed in exercise 1 will help you to correct HTML5 content problems, however they do not help very much with accessibility issues. For this, we need to conduct additional testing using a dedicated accessibility evaluation tool.

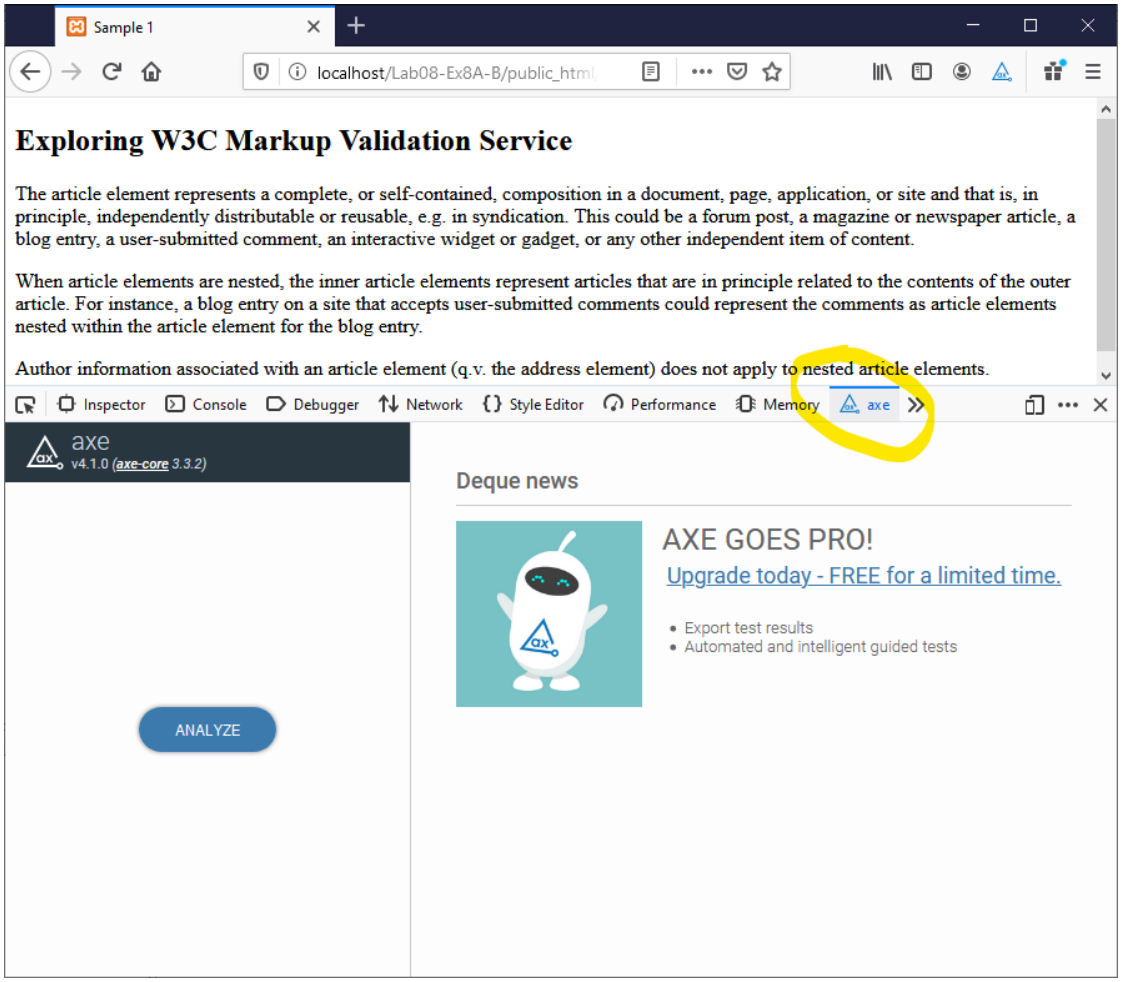
There are many such tools available (refer to https://www.w3.org/WAI/ER/tools/) and you are encouraged to experiment, however for this exercise we are going to use **axe**, one of the most popular accessibility testing tools available.

If you successfully installed either the Firefox or Chrome extension for axe as directed in section 3, you should see the axe icon in the upper right corner of your browser:

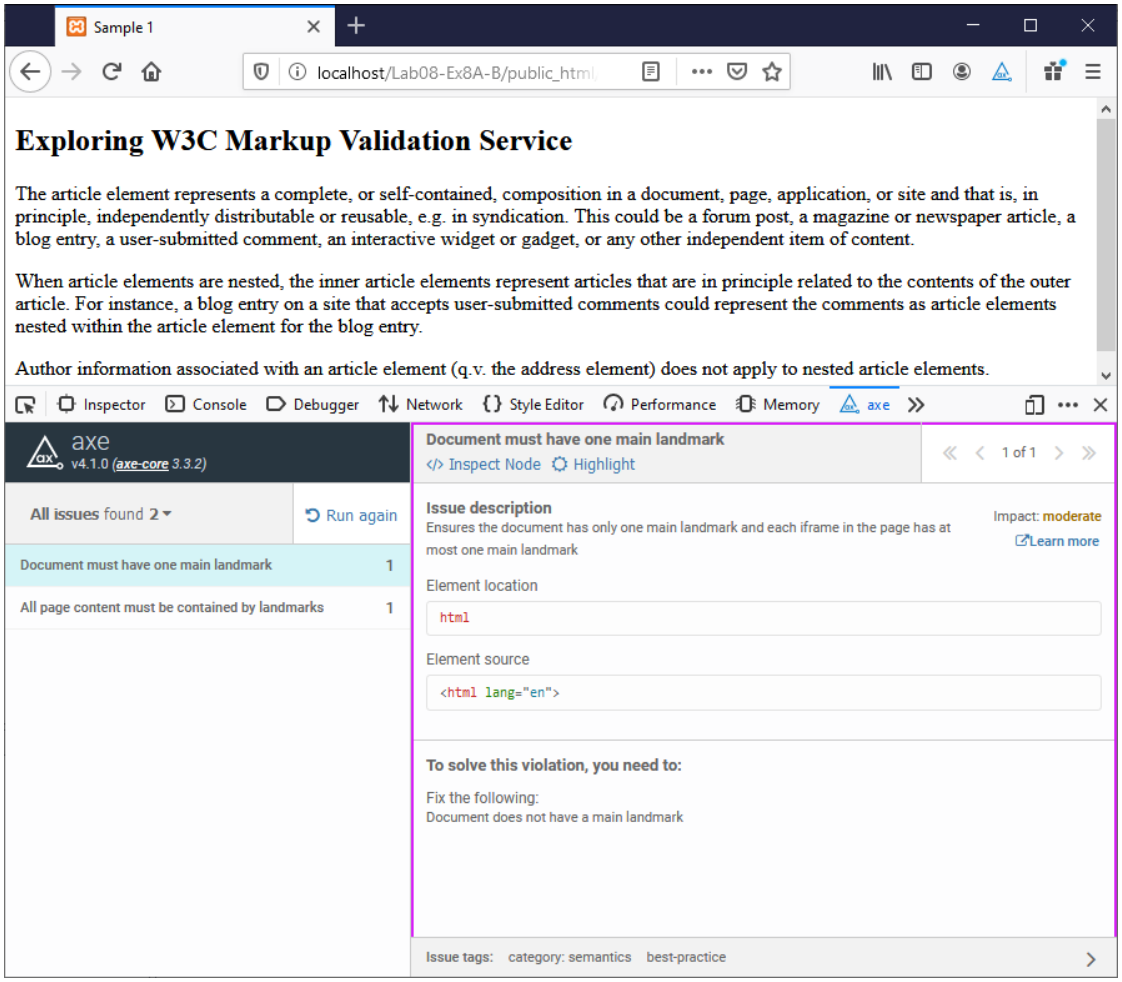


8.2 Now we'll perform accessibility testing on each of the sample files that we fixed in exercise 1. Follow these steps, starting with 'sample1.html':

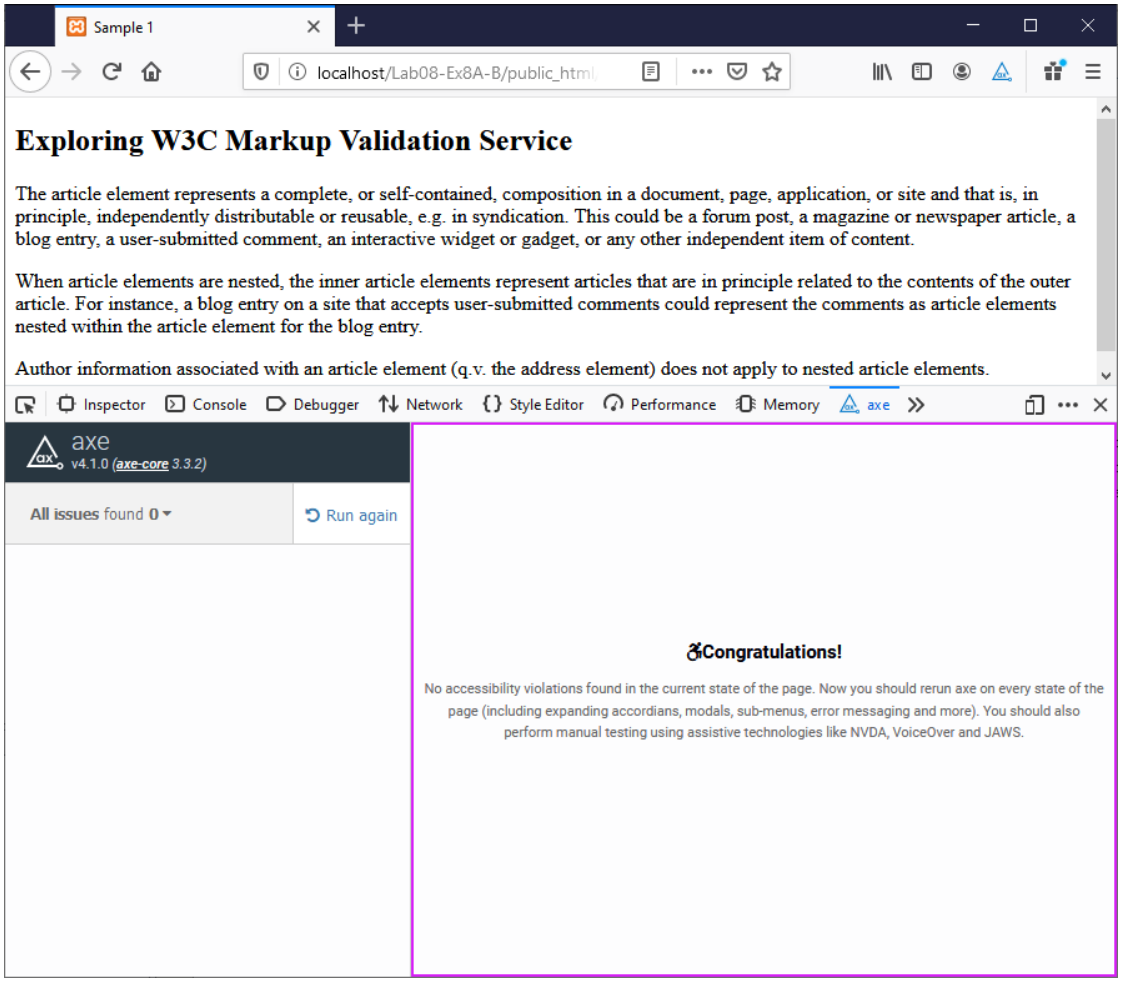
f. View 'sample1.html' in the browser, then activate the Developer Tools (F12). Look for the axe tab and click it:



g. Click the 'ANALYZE' button to start the accessibility testing. Two issues are found, both are because we're missing the <main> element in our document:



h. Edit the file to add the <main> tag, then run the accessibility test again to ensure all issues are resolved:



8.3 Repeat the above steps with the remaining files, 'sample2.html' and 'sample3.html', and fix all issues found.

Tip: if you get stuck, you can click the 'Learn more' link that's provided by axe for each issue.

8.4 Once you've fixed all validation and accessibility issues, submit the three files for your practical assignment.

9. SUBMISSION OF LAB ASSIGNMENT

9.1 In order to receive credit for this Lab assignment, you must submit your completed work to xSiTe LMS before the end of the week. To submit your work:

a. Save all files and close NetBeans.

b. In File Explorer, navigate to the location where you saved your project and right-click on the folder name, then select 'Send to -> Compressed (zipped) folder' and ZIP up your entire NetBeans project. **Note: only .zip format is acceptable, do not use .rar, .7z, or any other format.**

c. In the ICT1004 module on xSiTe, go to **Assessments->DropBox** and locate the Dropbox folder corresponding to this Lab. Click the link to open the Dropbox then

hit the **Add a File** button to submit your .zip file. You may also add comments if desired. Be sure to hit **Submit** to complete your submission.