Figure 1. This project is supported by Education Scotland

Working with Websites and Data

The ABCs of Web Design with Noteable workbook

CONTINUOUS LEARNING MATERIAL FOR COMPUTING SCIENCE TEACHERS FOLLOWING THE SQA CURRICULUM FOR COMPUTING SCIENCE

This resource follows the Scottish Curriculum for Excellence (CfE) statement for Practitioners and the **Experiences and Outcomes for planning learning, teaching and assessment at Third and Fourth levels of Digital Literacy.**

In this document we will cover the following Learning outcomes:

- **Getting started accessing Noteable**
- **Choosing the Web Development for Schools environment**
- **Using markup languages to build a website visually**

More information on the CfE can be found here:

https://education.gov.scot/nih/Documents/TechnologiesBenchmarksPDF.pdf

Contents

Getting started:

Welcome to Noteable!

Before making use of the materials described in this workbook, please make sure that you have carried out the following steps to gain access to Noteable:

1. Access supporting service Resources: https://noteable.edina.ac.uk/documentation/
2. Access supporting video playlists for Schools using Noteable: https://studio.youtube.com/channel/UCKhcyiuFyq8xTUlg_DpKIlA/playlists
3. Review the template Data Protection Impact Assessment available for teachers, schools and Local Authorities: https://blogs.glowscotland.org.uk/glowblogs/digilearn/2021/08/11/noteable-dpia-information/
4. **if access has not already been approved:** Request access to Noteable from your Local Authority.
5. Once the request is approved, Noteable is available as an Application through the GLOW App Library.

**If you are an independent school, please contact your local GLOW officer or the Scottish Council for Independent Schools.*

Welcome to this introductory guide on using computational notebooks and data with Noteable.

In this workbook, you will find instructions and information on the following:

1. Definitions of Noteable service components for GLOW users
2. Noteable, computational notebooks and accessing the service
3. Introduction to Web Development environments in Noteable for teaching the Scottish Computing Science BGE curriculum with consideration for benchmarks and outcomes laid out in .
4. How to launch a JupyterLab web development notebook with Noteable for teaching in Python
5. Available resources for web development and design
6. Available External Resources

1. Definitions and further information:

Authentication: authentication within the Noteable service refers to the ability to provide access to a subset of users for a specified customer. Authentication is pluggable, supporting a number of authentication protocols. For schools in Scotland, authentication takes place through the GLOW system.

Documentation: the documentation made available to schools online via www.noteable.edina.ac.uk/Documentation or such other web address notified by EDINA to the Subscriber on an ad hoc basis, which sets out a description of the Service and the user instructions for the Service.

EDINA: a centre for digital expertise, based at the University of Edinburgh as a division of the Information Services Group providing the Noteable service.

Git: software for tracking changes in any set of files, usually used for coordinating work among programmers collaboratively developing source code during software development. Its goals include speed, data integrity, and support for distributed, non-linear workflows (thousands of parallel branches running on different systems).

GitHub: a provider of Internet hosting for software development and version control using Git. It offers the distributed version control and source code management functionality of Git, plus its own features.

JupyterLab: the newest web-based interface for Jupyter notebooks.

Jupyter notebook: Jupyter notebooks are an open-source web application that facilitates the creation and sharing of documents that contain live code and supporting commentary in the form of an explanatory text. It is a platform that can be used throughout the academic process to organise an articulate elements of a teaching and learning workflow where programming and/or data analysis are involved. The Jupyter notebook web application is open source and supports interactive data analysis in over 40 programming languages.

Learning Management System: the web-based platform used by teachers to access Noteable. For teachers and students in Scottish school accessing Noteable, this will be through the GLOW system App Library.

Service: the Noteable service provided by EDINA, the University of Edinburgh

User ID: the unique identifier or username provided by a school for each individual Authorised User.

2. Noteable, notebooks and teaching

Noteable is a platform that adopts Jupyter notebooks for education and expands upon this open-source technology to write code and explanations. Noteable allows for a Jupyter notebook file to be saved as an '.ipynb' file format, with additional features to help you in your teaching of computing science topics and to work with environments for particular internet-related uses, such as web design.

Once you have accessed Noteable, you will have access to environments for coding activities, explanations, showing input and output, visualisations and more combined in one file and place. With Noteable, your files are saved online, and can be accessed any time by authenticating into GLOW and launching Noteable in the App Library.

It is commonly said that there are 3 languages that web developers **must** learn:

1. **HTML** to define the content of web pages
2. **CSS** to specify the layout of web pages
3. **JavaScript** to program the behaviour of web pages

With Noteable's Schools Web Development environment, you can design and builds web pages using appropriate mark-up languages including HTML, CSS, JavaScript.

If it is the first time you access Noteable, you will see this virtual guided tour screen of the service:

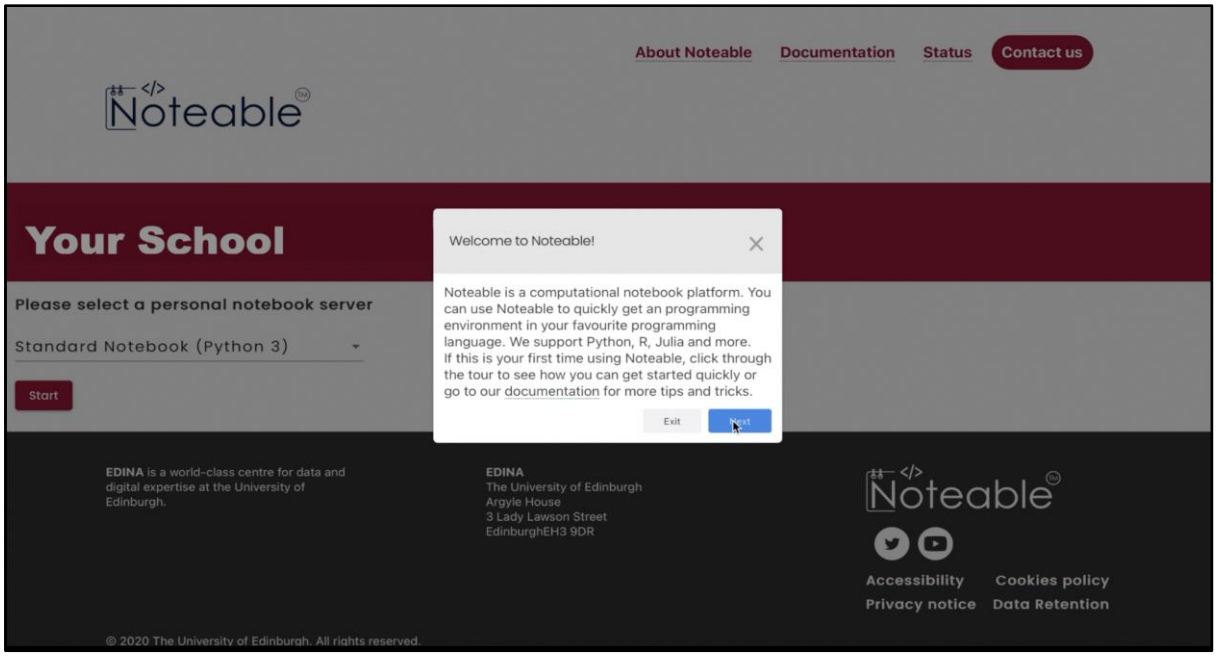

Figure 2. Guided tour for users first accessing Noteable

You will then be able to select a notebook server from the drop-down menu. The Standard Notebook on Noteable will be the default selected notebook when you first launch the service.

You can go ahead and click 'Start' if you would like to launch to Standard notebook server, this will give you access to the Jupyter Classic environment for coding with Jupyter notebooks.

To choose the web design coding environment, you can choose the **Schools Web Development** option from the list.

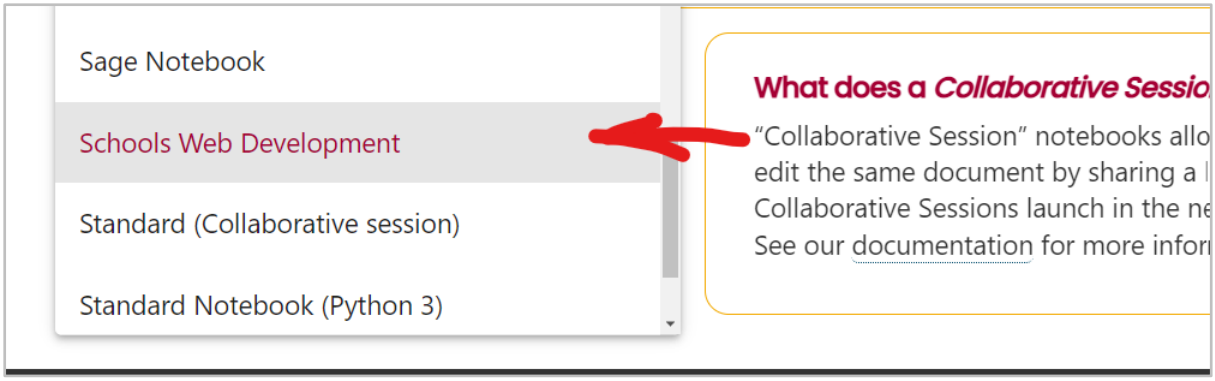

Figure 3. Schools Web Development option from notebook server menu

When you have accessed the Noteable server selection page, you can launch into the Schools Web Development environment and select the right solution for web design and development available in Noteable.

What is the Schools Web Development Environment?

The **Schools Web Development** notebook server has been specifically tailored and designed for use by teachers and students accessing Noteable via GLOW.

With this notebook server, you will access a JupyterLab environment with tools and languages available that combine to design and build webpages using appropriate mark-up languages.

You will also be able to design and build web pages which include interactivity using the programming languages HTML, JavaScript and CSS.

In the next section of this workbook at Level 1, you will find additional information on these website design programming languages and what they can be used for with Noteable.

3. Introduction to HTML, CSS and JavaScript in Noteable for teaching the Scottish Computing Science curriculum

HTML

HTML is an increasingly popular programming language used in web design and development.

It stands for the **Hypertext Markup Language**, and can be used to code for a variety of reasons, including on a server through web applications such as Noteable, or on a server to create web applications!

Quick guide to HTML Syntax on Noteable

- HTML stands for Hyper Text Markup Language
- HTML is the standard markup language for creating Web pages
- HTML describes the structure of a Web page
- HTML consists of a series of elements
- HTML elements tell the browser how to display the content
- HTML elements label pieces of content such as "this is a heading", "this is a paragraph", "this is a link", etc.
- Noteable provides access to a coding environment with the additional Jupyter Notebook interface, which follows the standard HTML syntax.

Here are examples of the main syntax you might use with HTML:

- **The <!DOCTYPE html> declaration defines that this document is an HTML5 document**
- **The <html> element is the root element of an HTML page**
- **The <head> element contains meta information about the HTML page**
- **The <title> element specifies a title for the HTML page (which is shown in the browser's title bar or in the page's tab)**
- **The <body> element defines the document's body, and is a container for all the visible contents, such as headings, paragraphs, images, hyperlinks, tables, lists, etc.**
- **The <h1> element defines a large heading**
- **The <p> element defines a paragraph**

Web Browsers and HTML

The purpose of a web browser (Chrome, Edge, Firefox, Safari) is to read HTML documents and display them correctly.

A browser does not display the HTML tags, but uses them to determine how to display the document. Below is a visualisation of an HTML page structure:

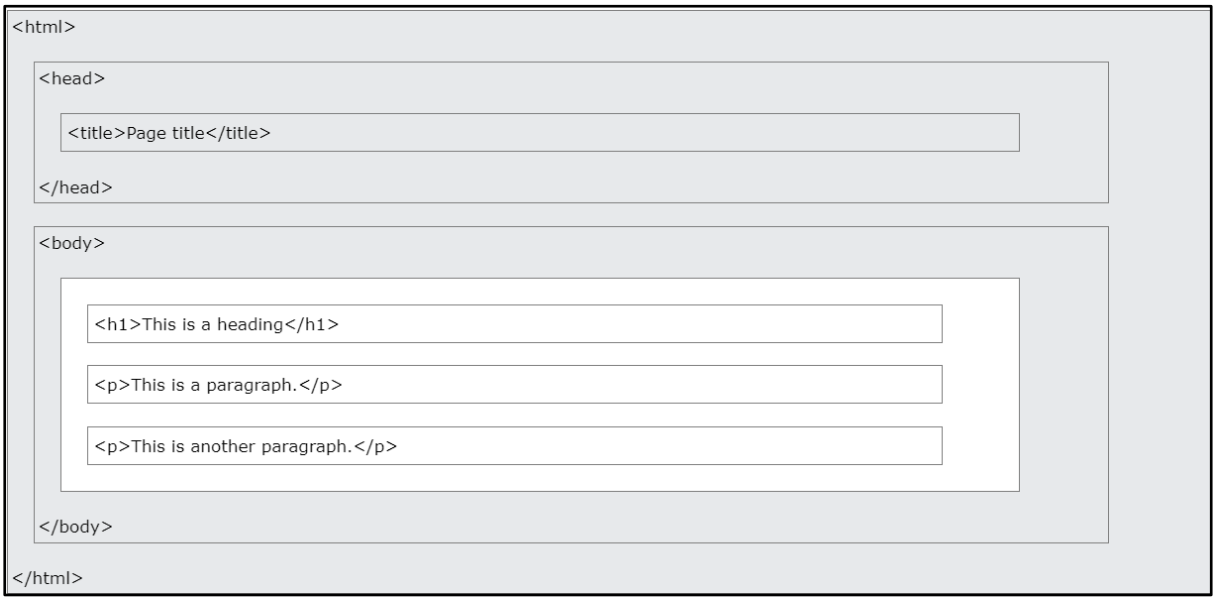

Figure 4. HTML page structure visualisation

Noteable provides access to web design environments through the JupyterLab unified architecture for viewing and editing data in a wide variety of formats. JupyterLab supports rendering HTML in cell output and editing HTML files as text in the file editor.

JavaScript

JavaScript is the world's most popular programming language. JavaScript is the 'programming language of the Web'.

Quick guide to what JavaScript can do

- JavaScript Can Change HTML Content: One of many JavaScript HTML methods is 'getElementById()'. The example below "finds" an HTML element (with id="demo"), and changes the element content (innerHTML) to "Hello JavaScript".
    - Example: document.getElementById("demo").innerHTML = "Hello JavaScript"
- JavaScript accepts both double and single quotes
- JavaScript can change HTML attribute values
- JavaScript can change HTML styles
- JavaScript can hide and show HTML elements

CSS

CSS is the language we use to style an HTML document. CSS describes how HTML elements should be displayed and is used to define styles for your web pages, including the design, layout and variations in display for different devices and screen sizes.

Quick guide to what CSS can do and what it is used for

- CSS stands for Cascading Style Sheets
- CSS describes how HTML elements are to be displayed on screen, paper, or in other media
- CSS saves a lot of work. It can control the layout of multiple web pages all at once
- External stylesheets are stored in CSS files

Web Browsers, Noteable and working with HTML

The purpose of a web browser is to read HTML documents and display them correctly. Some popular examples include Google Chrome, Microsoft Edge, Mozilla Firefox, Apple's Safari.

4. How to launch a blank notebook for web development in JupyterLab with Noteable for teaching

When you first access Noteable, you will see a list of options to choose a notebook environment from.

To launch a web development environment with Noteable, click on the **Schools Web Development** notebook option from this menu.

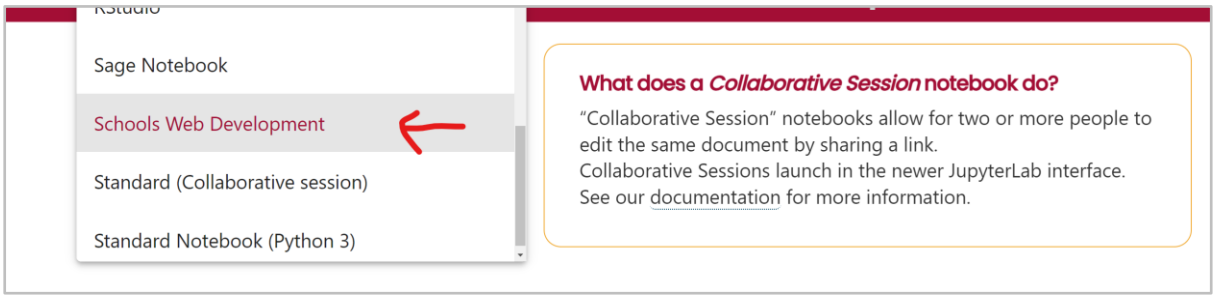

Figure 5. Choose the Schools Web Development environment

This will take you to the JupyterLab environment. JupyterLab is the latest **web-based interactive development environment for notebooks, code, and data**. Its flexible interface allows users to configure and arrange workflows in data science, scientific computing, computational journalism, and machine learning. For our purposes here, we will be using JupyterLab **to access and develop a web development environment with CSS, JavaScript and HTML.**

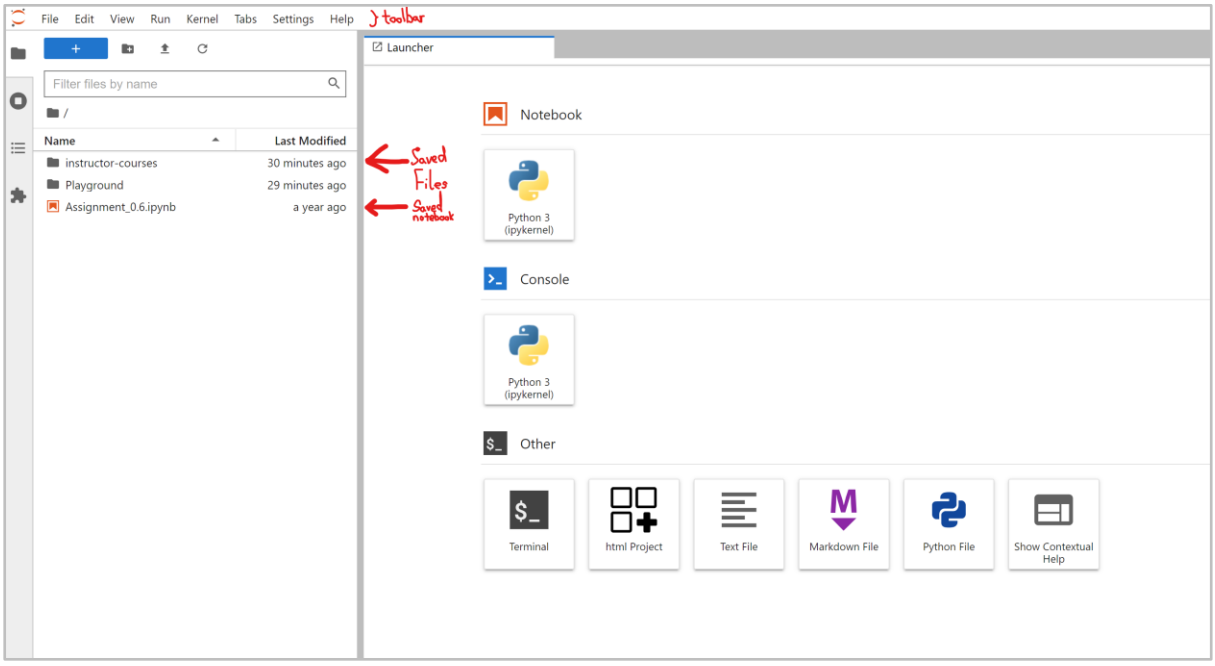

Figure 6. Schools Web Development environment with JupyterLab

You can then choose the web development project by choosing ‘HTML project’ in the Launcher:

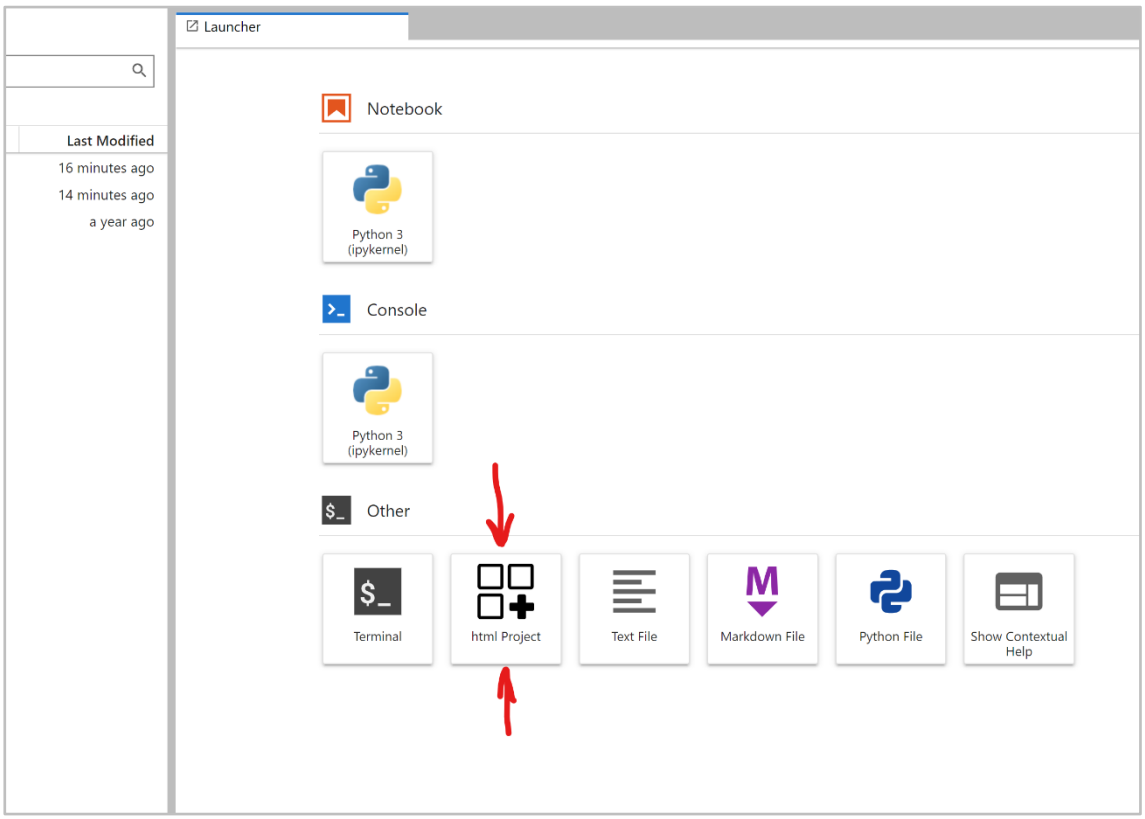

Figure 7. The HTML project option in the Schools Web Development Environment

This will launch a preconfigured environment where you can drag-and-drop windows for CSS, JavaScript and HTML environments and start creating, teaching and learning about websites.

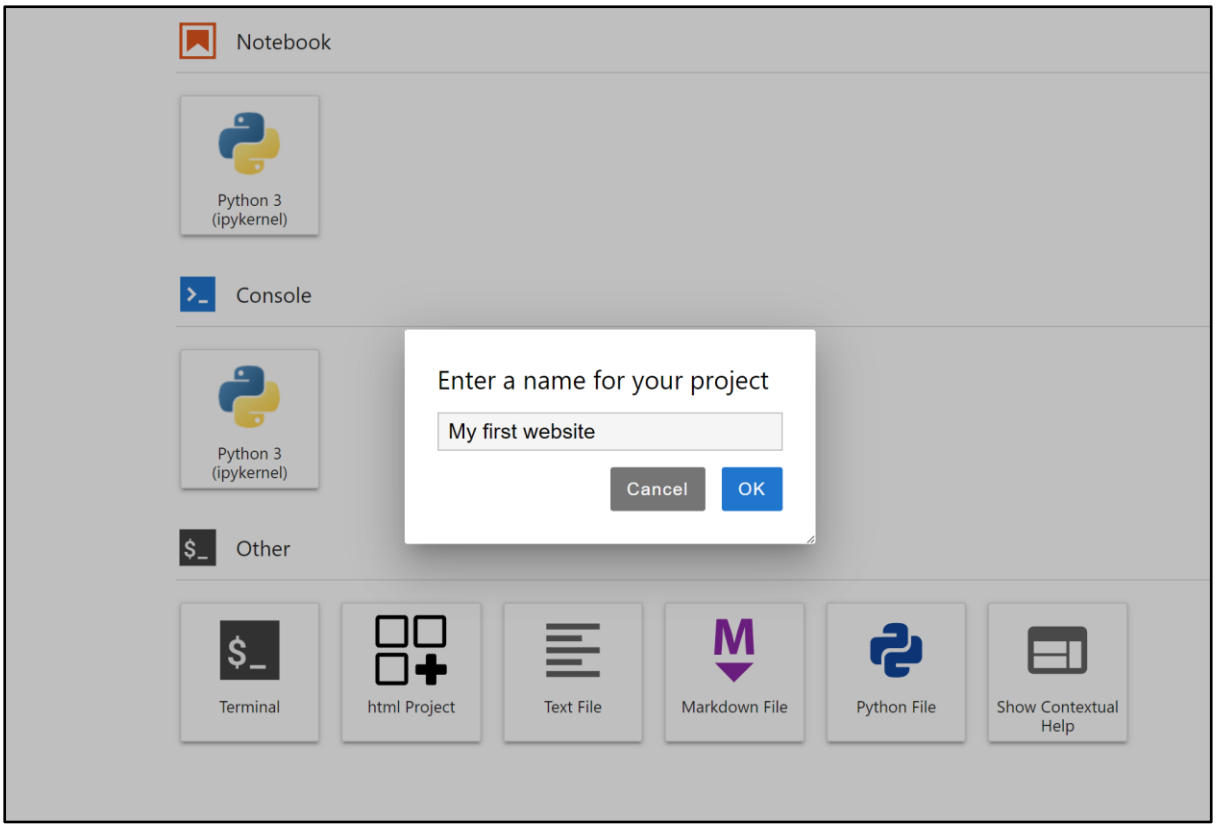

Figure 8. My first website popup creating a new HTML project

This is what a rearranged window view of the same environments looks like:

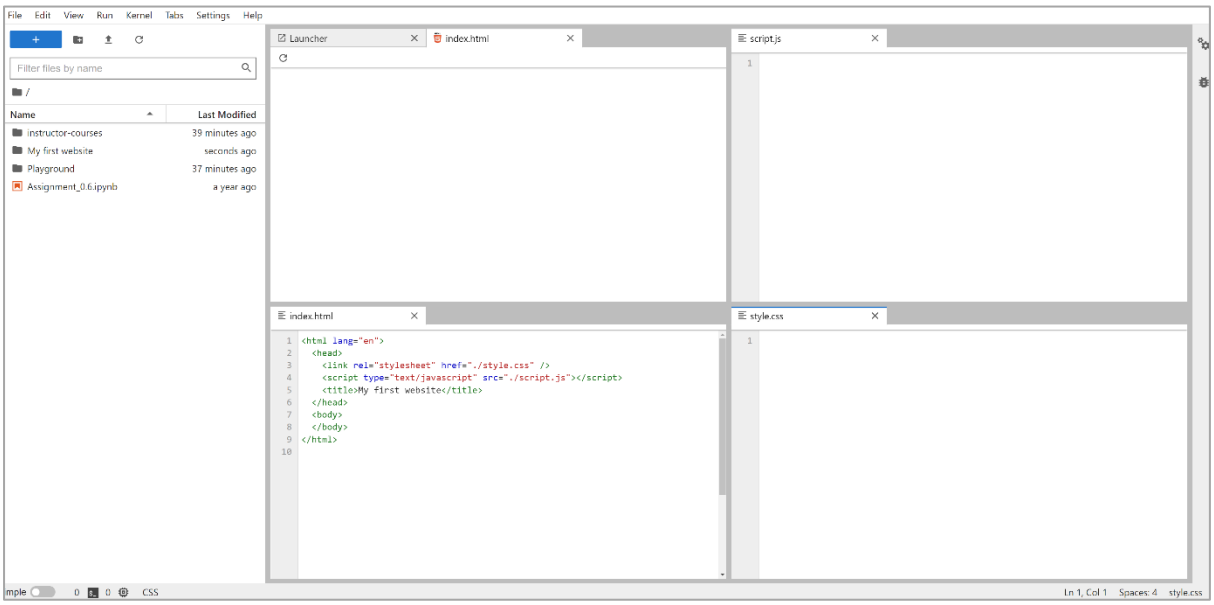

Figure 9. Rearranging windows in the Noteable web development environment

The code cell is where you will be able to code straightaway, and you will see a blinking cursor in the code cell.

When you think about programming generally, and about coding specifically with HTML, CSS, JavaScript and other programming languages, the first thing to note is that coding languages aren't like most other languages spoken between human beings. There are no vocabularies, alphabets or dialects.

Instead, each coding language is unique and uses special commands and abbreviations in order to work properly. In addition to web design and development programming languages, the Python and R programming languages are readily available on Noteable for teaching the Scottish Curriculum in Computing Science, Mathematics and other subjects.

Additional materials have been developed focussing on each programming language. Please refer to the Github page with available resources for importing into Noteable:

https://github.com/edina/Python-and-RStudio-school-resources

5. Available resources for Web Development with Noteable

Video

Watch our short video to check out how to; start Noteable JupyterLab, start a new HTML project, and start creating your web page!

To view the video, select the play button below or select this link:

https://youtu.be/uSGWAsIQwHs

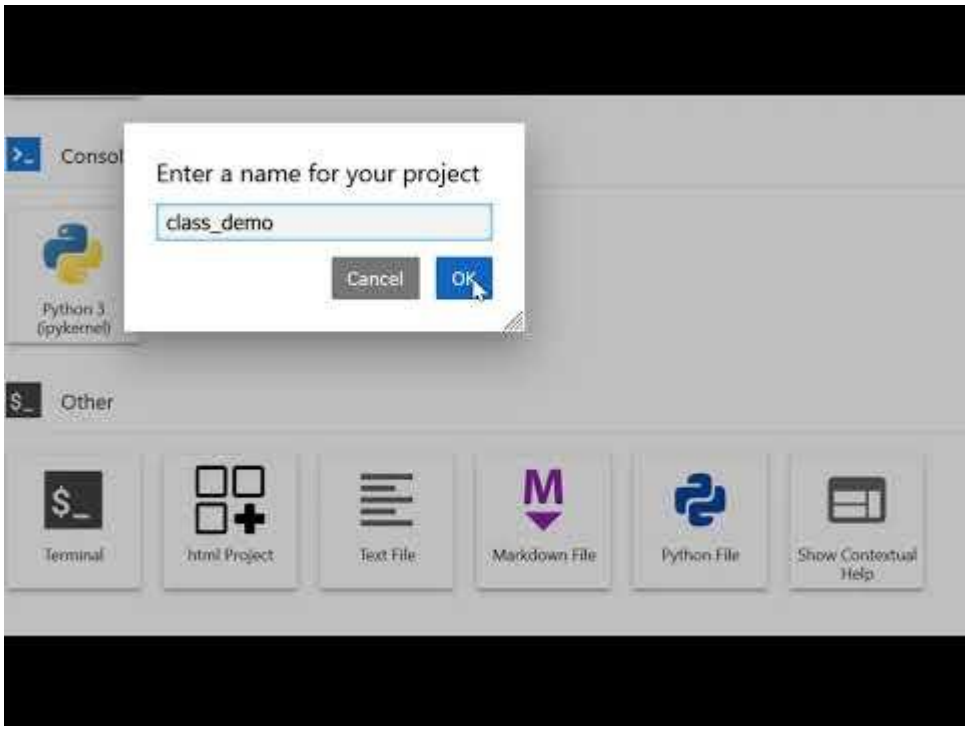

Figure 10 YouTube video - Start a new HTML project in Noteable JupyterLab

Download and import an HTML project

1. **Click on this text to download a zip file with an HTML project.**
2. Login to Noteable.
3. Select **Schools Web Development** at the Launch window.
4. Select **Upload Files** - this is an arrow icon near the plus button, on the File Browser Tab – see the image below:

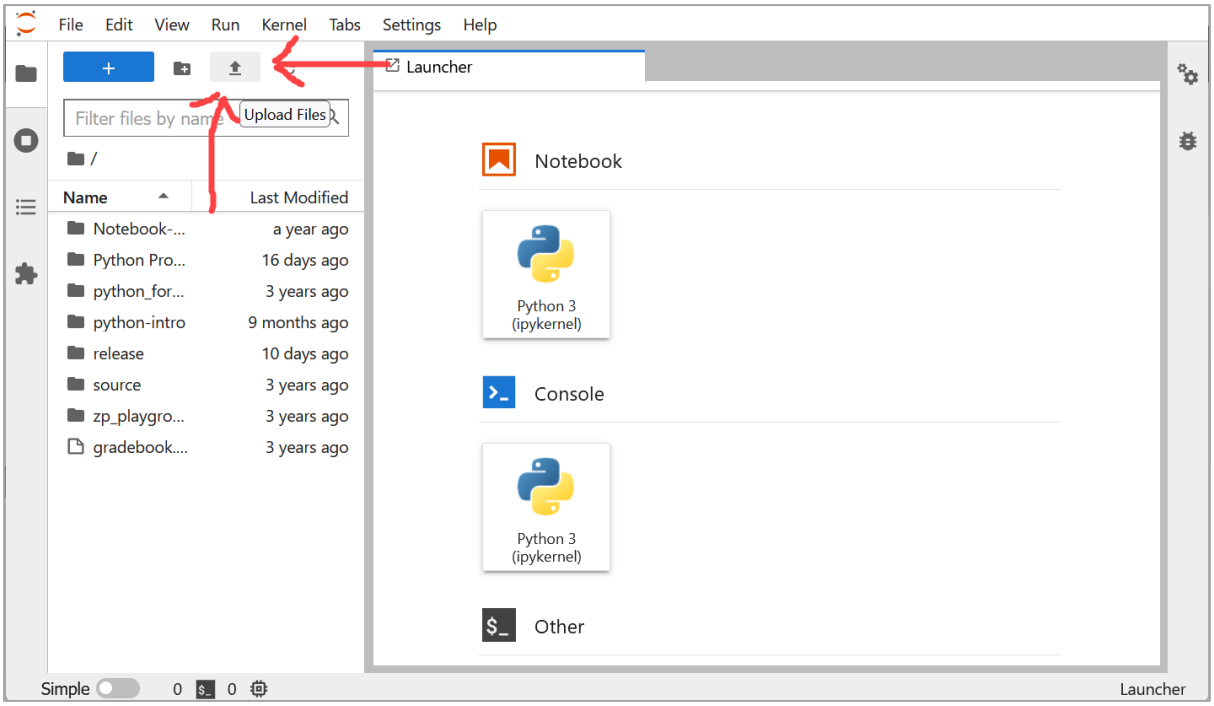

Figure 11 Upload Files button in Noteable JupyterLab

5. Find your zip file. Select it, then select Open. See image below (Windows File Upload – your device may look different).

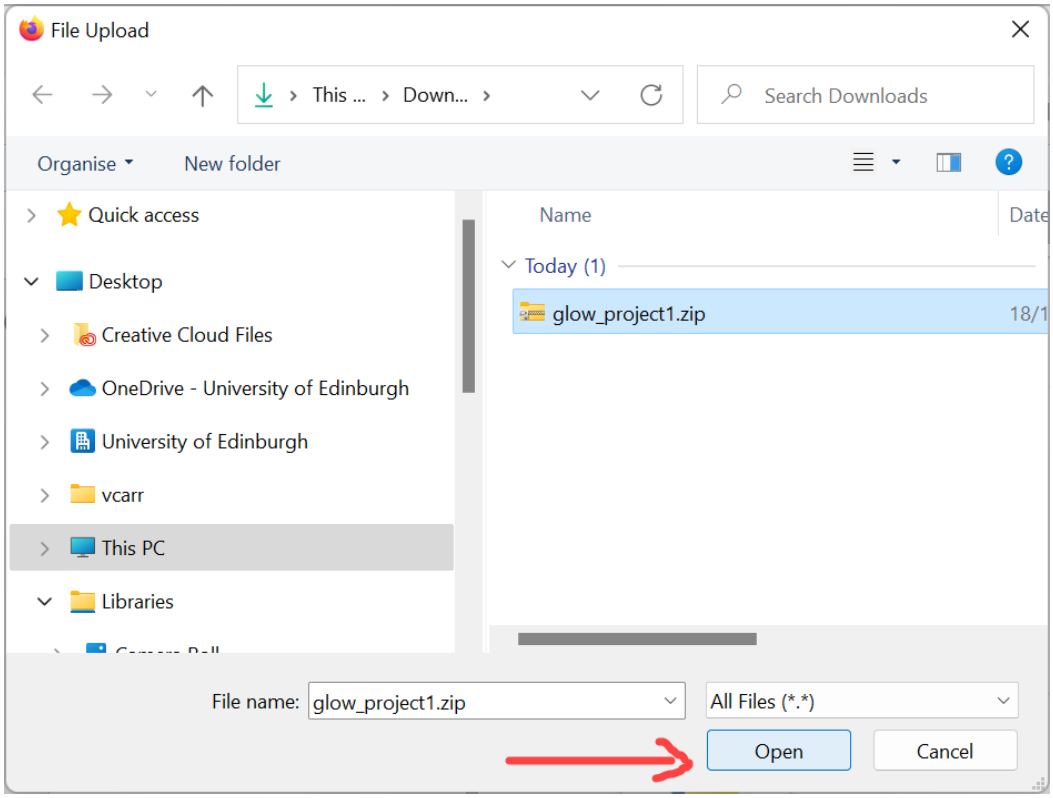

Figure 12. File upload button with zip file selected and Open button highlighted.

6. Find your zip file in Noteable JupyterLab.
7. Right click on it.
8. Select **Extract Archive** – see image below.

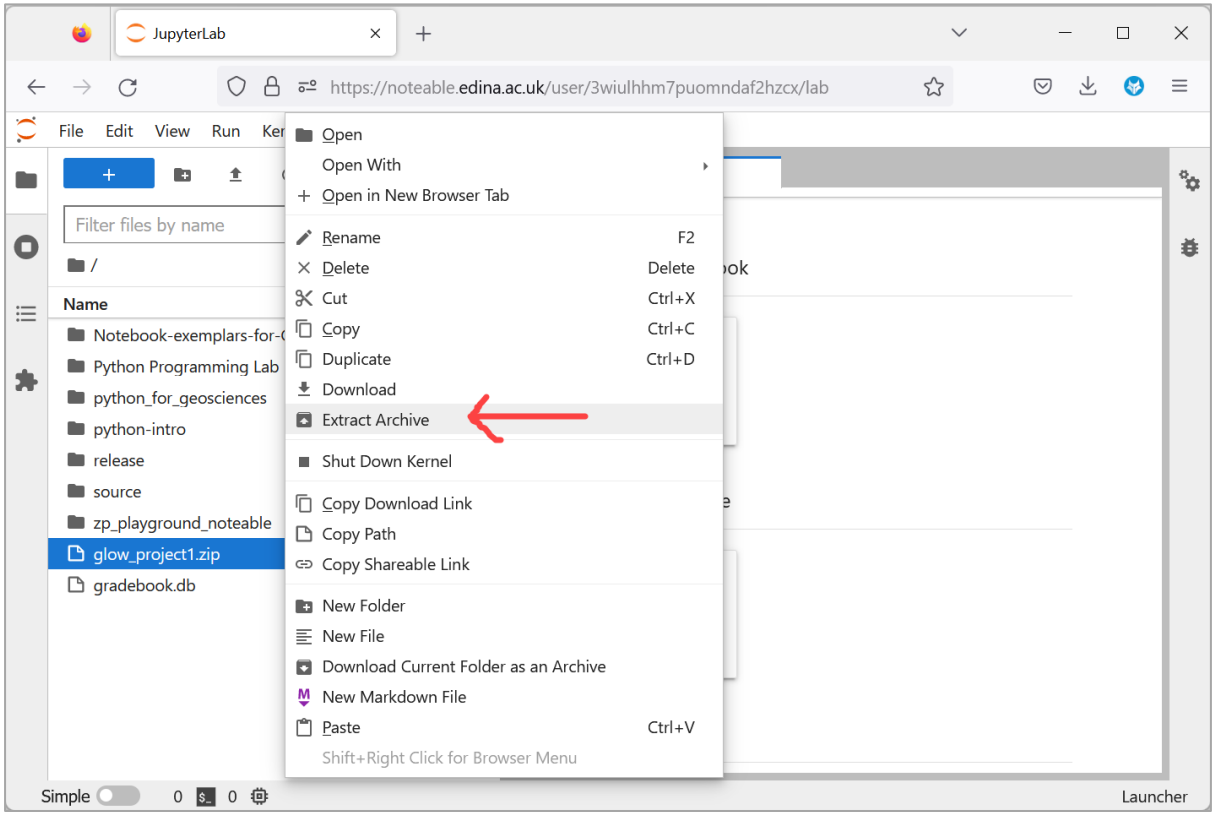

Figure 13 Zip file selected and Extract Archive highlighted.

9. You will now see a folder with the same name as your zip file.
10. Inside the folder, you will see some files**; index.html, script.js and style.css** – see image below:

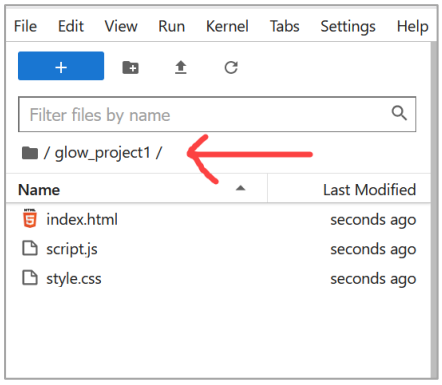

Figure 14 Files visible within extracted zip archive.

11. Open the index.html file. This is your web page. You will see a heading has been added, “My Class Project”, with blue text.
12. Now open index.html *WITH EDITOR* – see image below:

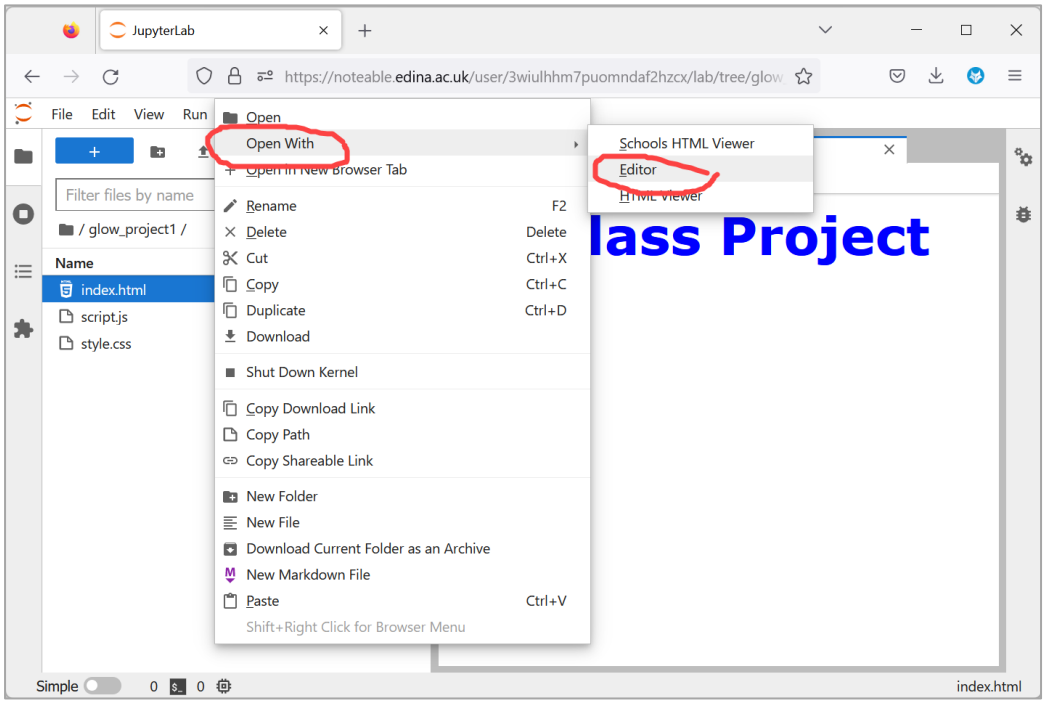

Figure 15 Open index.html with Editor.

13. You will now see the HTML code. Now you can make changes and add more content to your page – see image below:

14. Change the heading – change the text within the H1 tags to your name or school name and check out the change.
15. Open style.css – you will see the details of the blue text and font – see image below:

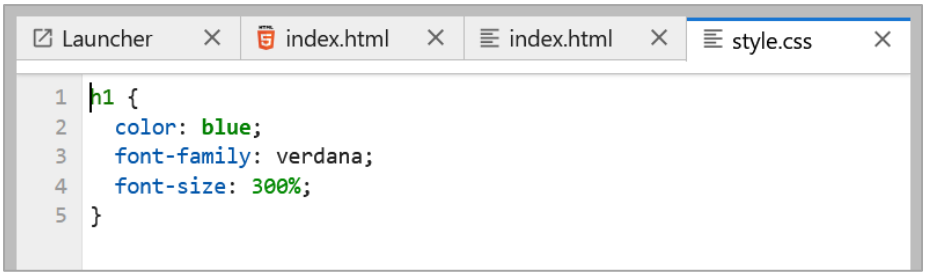

Figure 16 CSS file with H1 colour font-family and font-size.

16. Change the text colour. Type red and delete blue and check out the change on index.html.

Reference Attributions & Available Resources for Web development and Noteable

Attributions

This workbook and exercises alongside this workbook include content adapted from a number of sources with creative commons licenses open to share and compatible with the **Creative Commons Attribution 4.0 International License** for these resources.

References for HTML

- An online starter's guide to Jupyter Notebooks: https://www.analyticsvidhya.com/blog/2018/05/starters-guide-jupyter-notebook/
- Markdown for Jupyter notebooks cheatsheet, including information on how to format Markdown cells in Jupyter notebooks.

Link to resource: https://www.ibm.com/docs/en/watson-studio-local/1.2.3?topic=notebooks-markdown-jupyter-cheatsheet

- IBM guidance on using Jupyter notebooks: https://www.ibm.com/docs/en/watson-studio-local/1.2.3?topic=data-notebooks
- Python W3 Tutorials: https://www.w3schools.com/python/