

INC281
2020



INC281-Lecture01

Introduction and Basic HTML

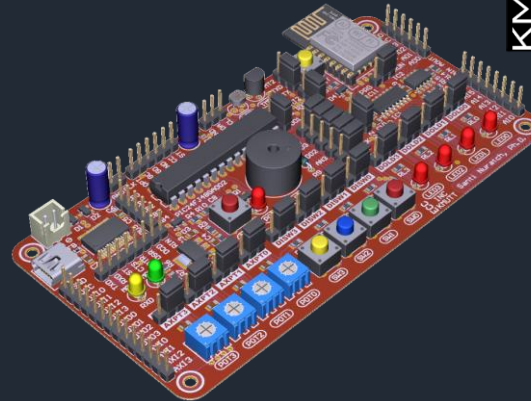
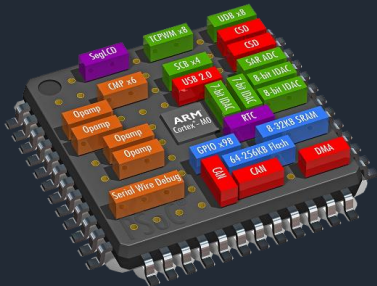


ECC

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Asst.Prof.Dr.Santi Nuratch

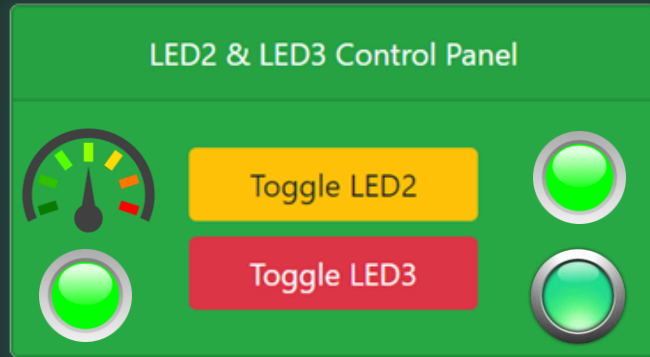
Embedded Computing and Control Lab. @ INC-KMUTT

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Department of Control System and Instrumentation Engineering,
King Mongkut's University of Technology Thonburi, **KMUTT**

Develop your own IoT applications

Web-based Application

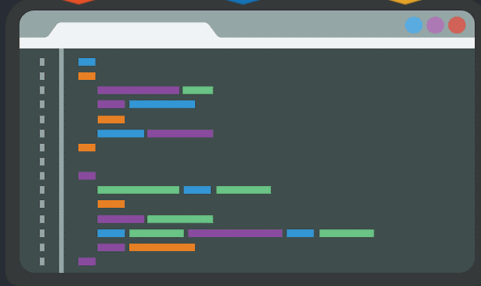
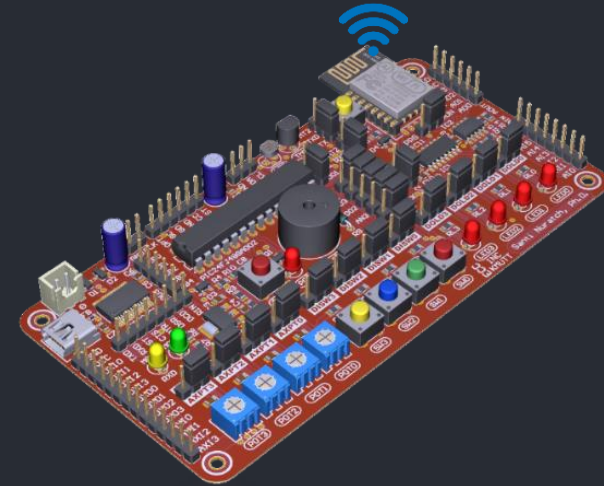


Internet

HTTP
WebSockets
MQTT



IoT Device



Develop your own IoT applications

60%



Programming

20%



Documents

20%



Presentation

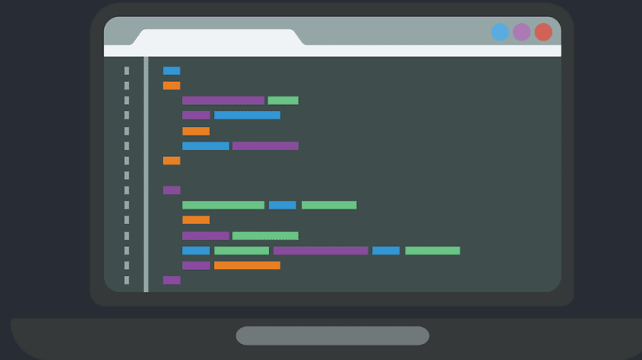
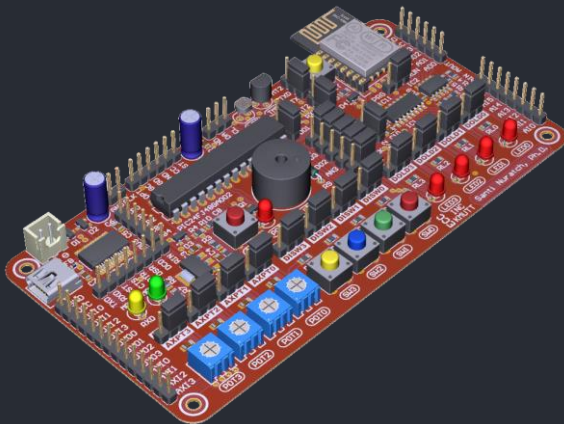
What is your project?

(Design and submit the 1st document next week!)

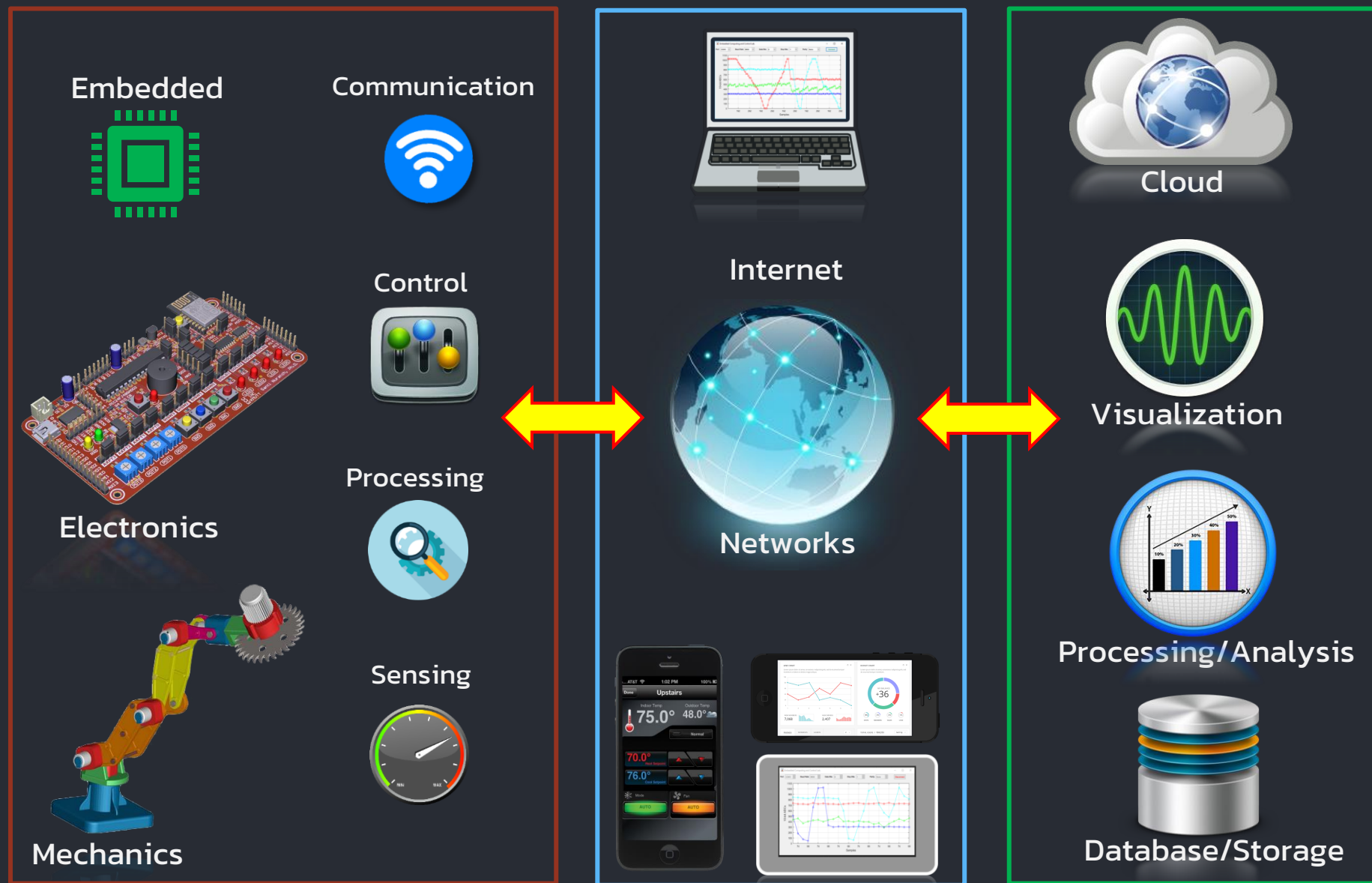
24 March, 2020

20%

1. Hardware: Block diagram, circuit, description (in-depth details)
2. Software: Graphics User Interface, function description (in-depth details)



IoT Application Components



IoT Device

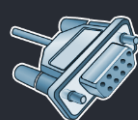


- Electronic Circuits (Sensors/Actuators)
- Microcontroller Circuit & System
- Embedded C Programming

Embedded Programming

Embedded C

Algorithms



IoT Application



- Web/GUI Design (HTML, CSS)
- JavaScript Programming (ES6)
- Web-based Control & Data Visualization

Web (Client/Server) Programming

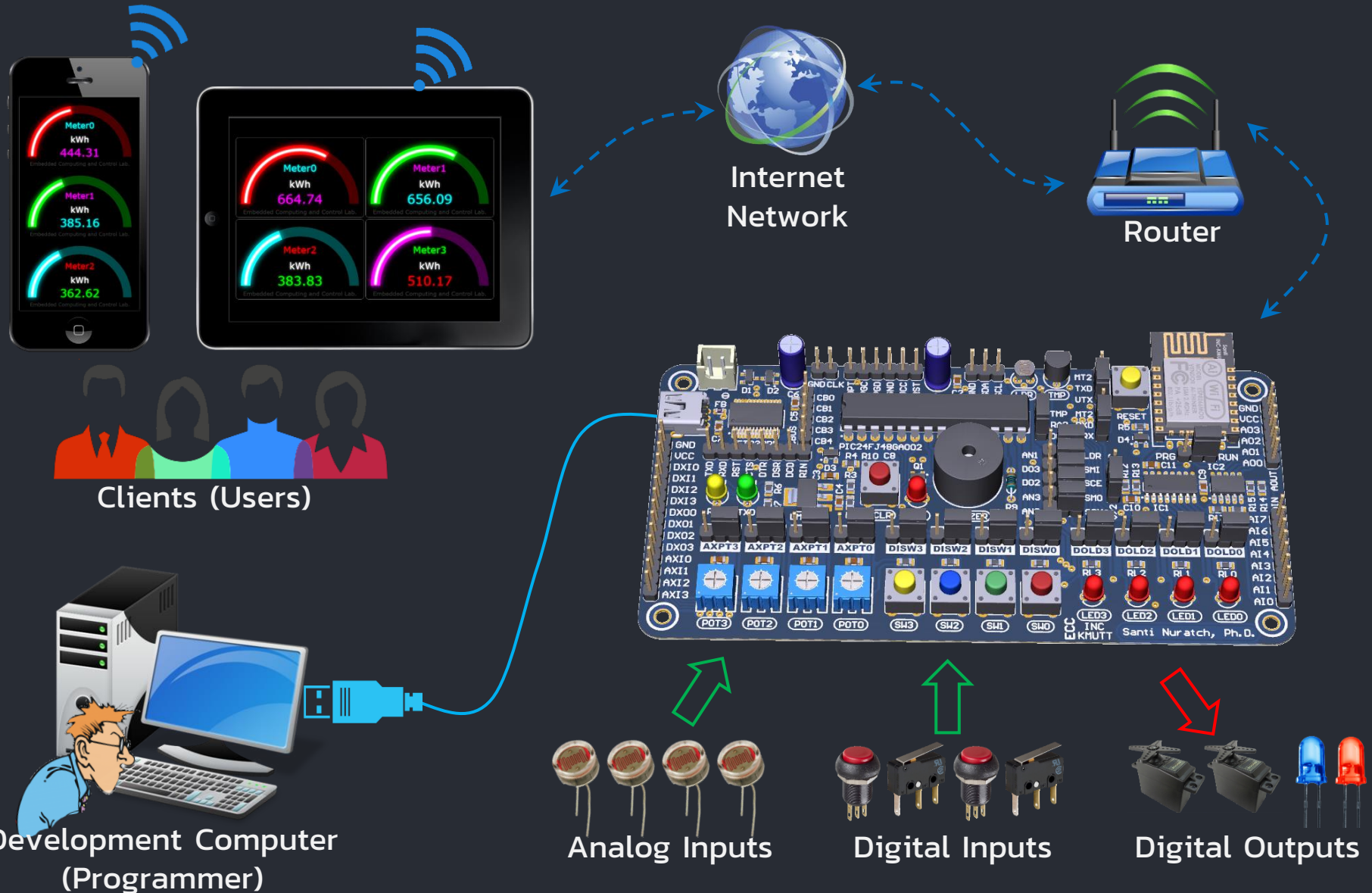
Web

Node.js

MongoDB



We integrate hardware and Software



INC281/2 Learning Topics

This is the second section of the INC281. We focus on the basics of Web-based application development, Web-based programming. Three main parts to be studied in this section.

15% 1. **HTML** (Hypertext Markup Language)

15% 2. **CSS** (Cascading Style Sheet)

30% 3. **JavaScript**

60%



Programming

20%



Documents

20%



Presentation

HTML is the markup language that we use to structure and give meaning to our web content, for example defining paragraphs, headings, and data tables, or embedding images and videos in the page.

```
<html><head><title>INC281</title></head><body><h1>Welcome to Web Programming</h1></body></html>
```

CSS is a language of style rules that we use to apply styling to our HTML content, for example setting background colors and fonts, and laying out our content in multiple columns.

```
body{background-color: red; color: red; font-family: Helvetica; text-align: center; padding: 3px 10px;}
```

JavaScript is a scripting language that enables you to create dynamically updating content, control multimedia, animate images, and pretty much everything else.

```
let h1 = document.querySelector("h1"); h1.addEventListener("click", ()=>{h1.textContent="Hello INC281"});
```


Code Editor and Extension

We use the **VSCode** and **Live Server** to develop our applications. Also, a Web browser, e.g., **Google Chrome** or **Mozilla Firefox**, is required.



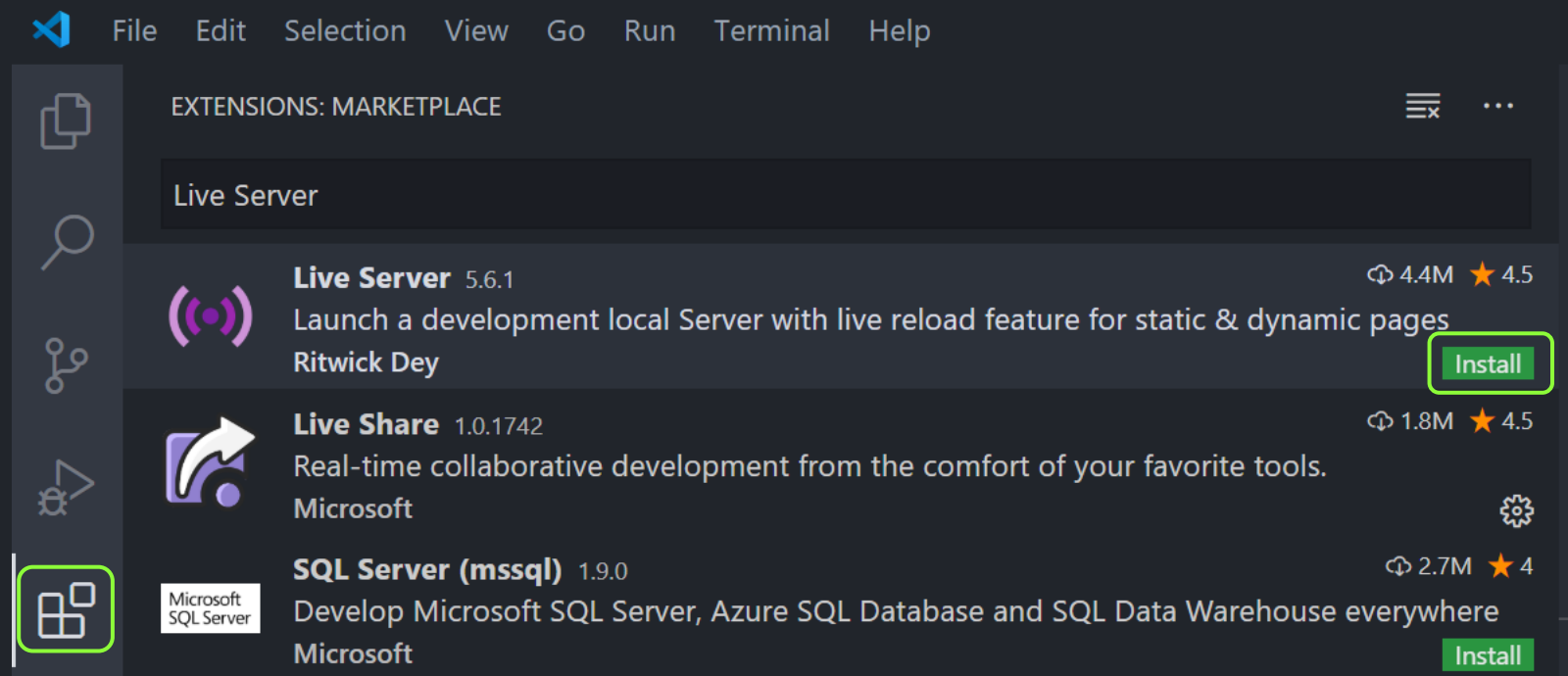
1. Download and install the VSCode



2. Install the Live Server extension

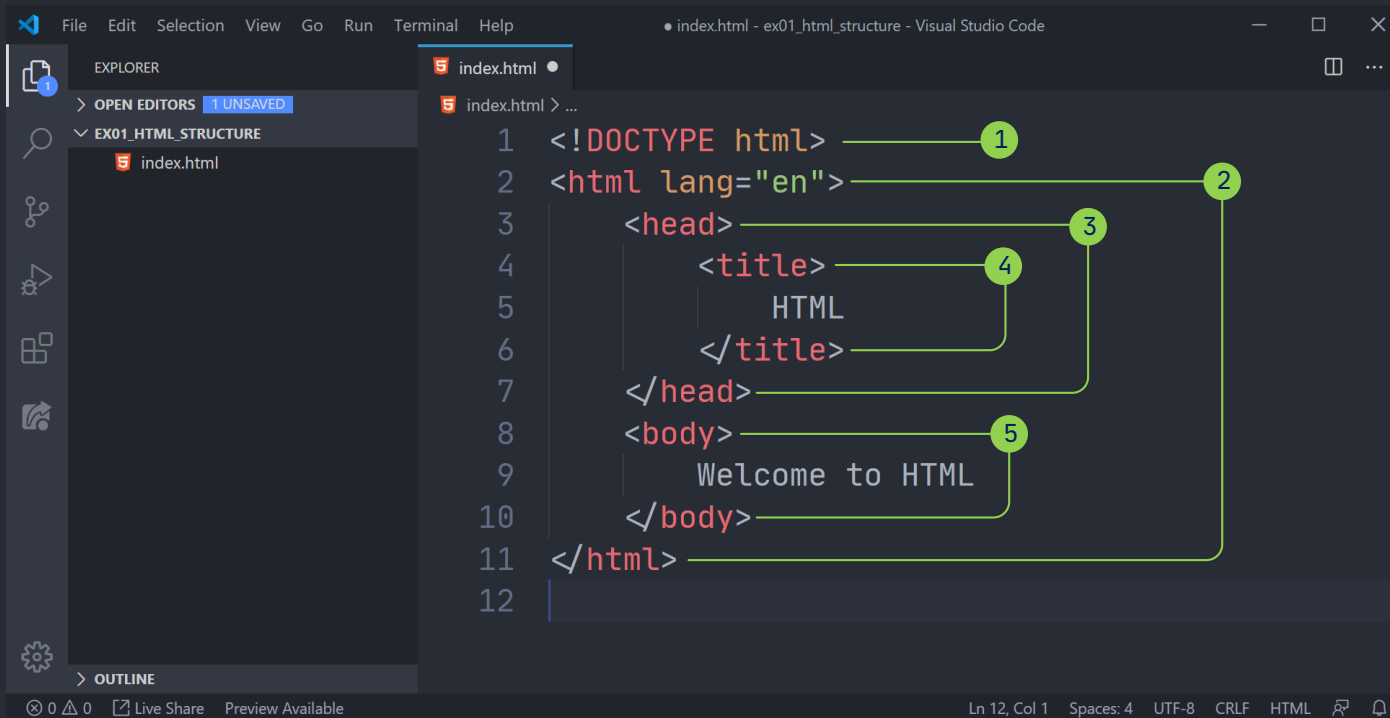


3. Download and install the Google Chrome or Mozilla Firefox



Create a new Project

- 1) Create a new directory (folder), "**ex01_html_structure.html**"
- 2) Run the VSCode and open the created directory
- 3) Create a webpage file, "**index.html**" and add the lines of code



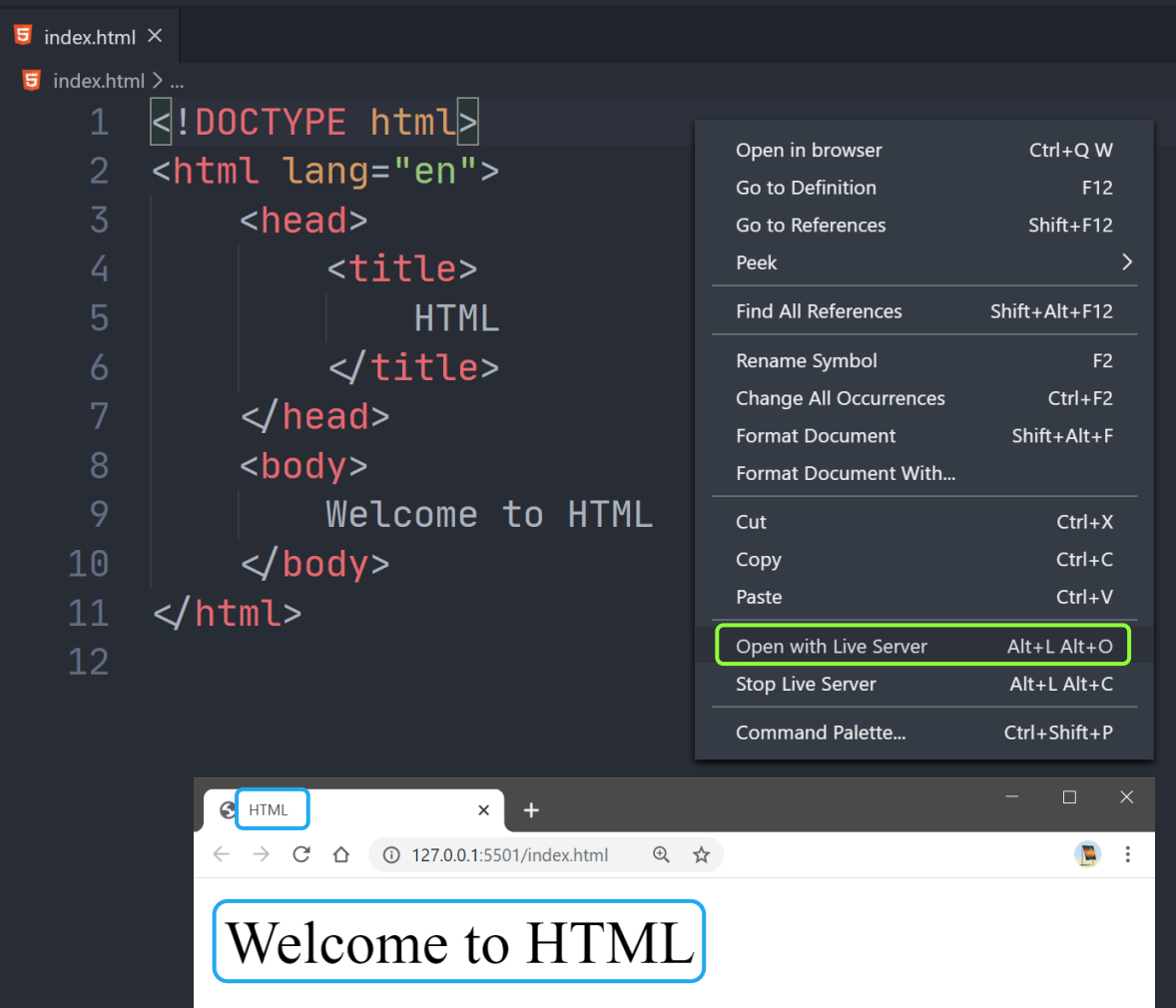
```
1 <!DOCTYPE html>
2 <html lang="en">
3   <head>
4     <title>
5       HTML
6     </title>
7   </head>
8   <body>
9     Welcome to HTML
10  </body>
11 </html>
```

The screenshot shows the Visual Studio Code interface with a file named `index.html` open. The code is an HTML document structure. Green lines and numbers (1-5) are overlaid on the code to highlight specific parts: 1 points to the `<!DOCTYPE html>` declaration, 2 points to the `<html lang="en">` opening tag, 3 points to the `<head>` opening tag, 4 points to the `<title>` opening tag, and 5 points to the `<body>` opening tag. The Explorer sidebar on the left shows the project structure with a folder named `EX01_HTML_STRUCTURE` containing `index.html`. The status bar at the bottom indicates the current position is Line 12, Column 1.

- 1 The **<!DOCTYPE>** type declaration must be the very first thing in your HTML document
- 2 Declares the webpage to be written in **HTML**
- 3 Delimits the webpage's **head**
- 4 Defines the webpage's **title**
- 5 Delimits the webpage **body**

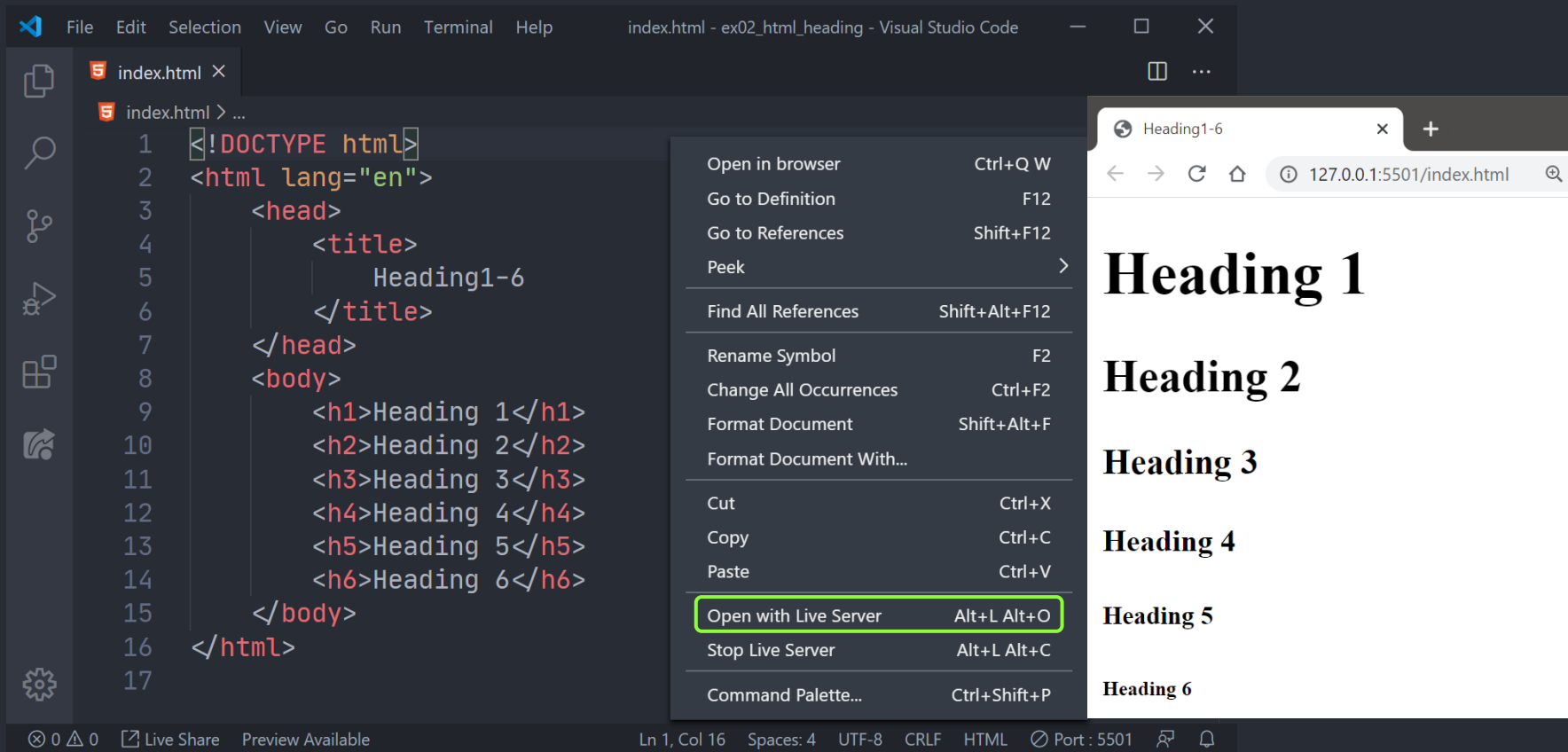
Check the result on the Web browser

- 1) Save the code (**CRTL+S**)
- 2) Right-Click on the HTML code and choose the "**Open with Live Server**"
- 3) Check the result on the web browser



HTML Heading (h1 to h6)

- 1) Create a new directory (folder), "ex02_html_heading"
- 2) Run the VSCode and open the created directory
- 3) Create a webpage file, "index.html" and add the lines of code
- 4) Save the file, run the "Live Server" and check the result in the web browser



The screenshot displays the Visual Studio Code editor with a file named `index.html` open. The code is as follows:

```
1 <!DOCTYPE html>
2 <html lang="en">
3   <head>
4     <title>
5       Heading1-6
6     </title>
7   </head>
8   <body>
9     <h1>Heading 1</h1>
10    <h2>Heading 2</h2>
11    <h3>Heading 3</h3>
12    <h4>Heading 4</h4>
13    <h5>Heading 5</h5>
14    <h6>Heading 6</h6>
15  </body>
16 </html>
17
```

A context menu is open over the code, with the "Open with Live Server" option highlighted. The menu also includes options like "Open in browser", "Go to Definition", "Go to References", "Peek", "Find All References", "Rename Symbol", "Change All Occurrences", "Format Document", "Format Document With...", "Cut", "Copy", "Paste", "Stop Live Server", and "Command Palette...".

To the right, a web browser window titled "Heading1-6" shows the rendered HTML. The address bar indicates the URL `127.0.0.1:5501/index.html`. The browser displays the following content:

Heading 1

Heading 2

Heading 3

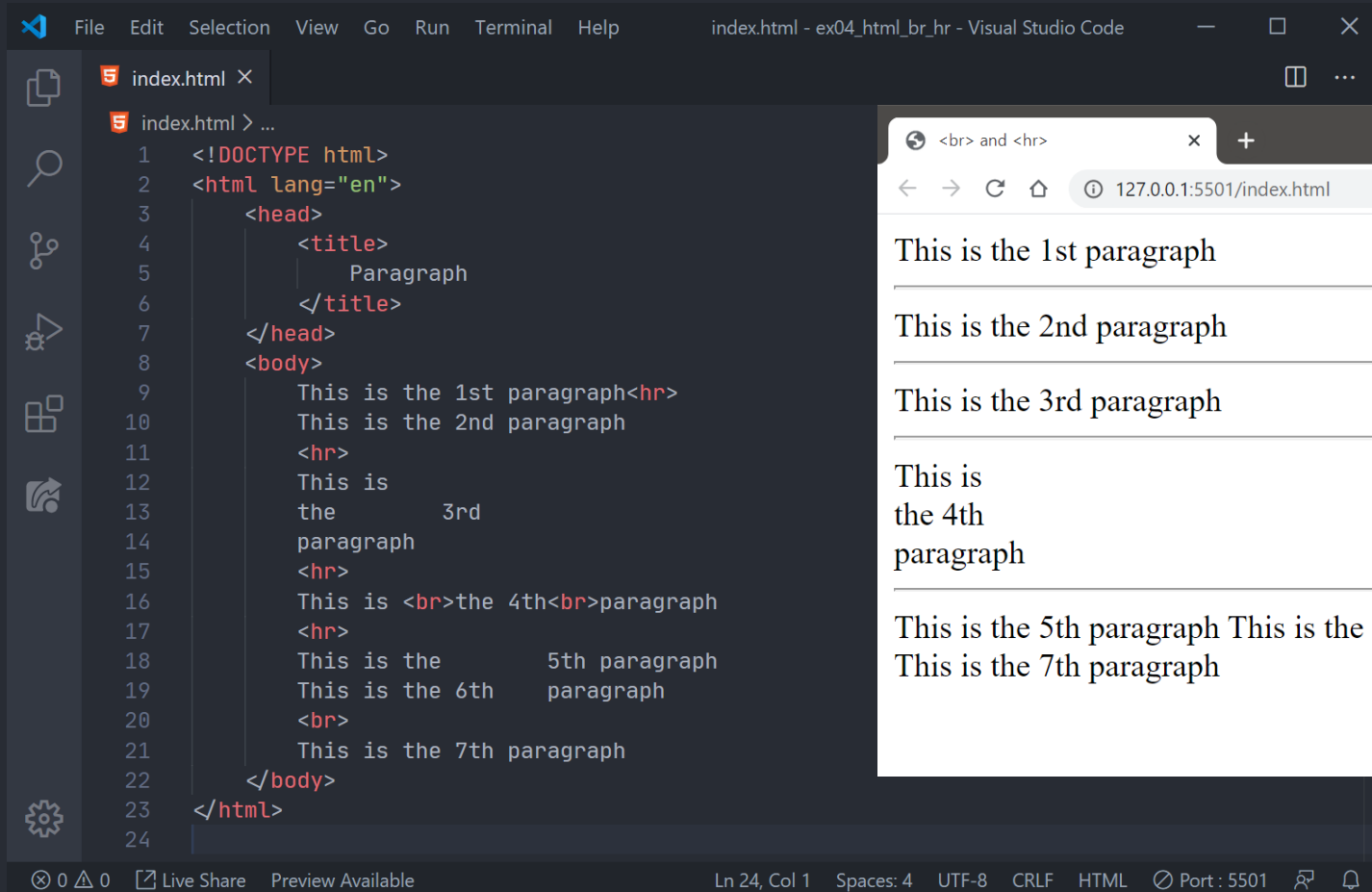
Heading 4

Heading 5

Heading 6

HTML Line Break and Horizontal Rules

- 1) Create a new directory (folder), "ex04_html_br_hr"
- 2) Run the VSCode and open the created directory
- 3) Create a webpage file, "index.html" and add the lines of code
- 4) Save the file, run the "Live Server" and check the result in the web browser



```
1 <!DOCTYPE html>
2 <html lang="en">
3   <head>
4     <title>
5       Paragraph
6     </title>
7   </head>
8   <body>
9     This is the 1st paragraph<br>
10    This is the 2nd paragraph
11    <br>
12    This is
13    the      3rd
14    paragraph
15    <br>
16    This is <br>the 4th<br>paragraph
17    <br>
18    This is the      5th paragraph
19    This is the 6th   paragraph
20    <br>
21    This is the 7th paragraph
22  </body>
23 </html>
24
```

The live preview shows the rendered HTML output:

This is the 1st paragraph

This is the 2nd paragraph

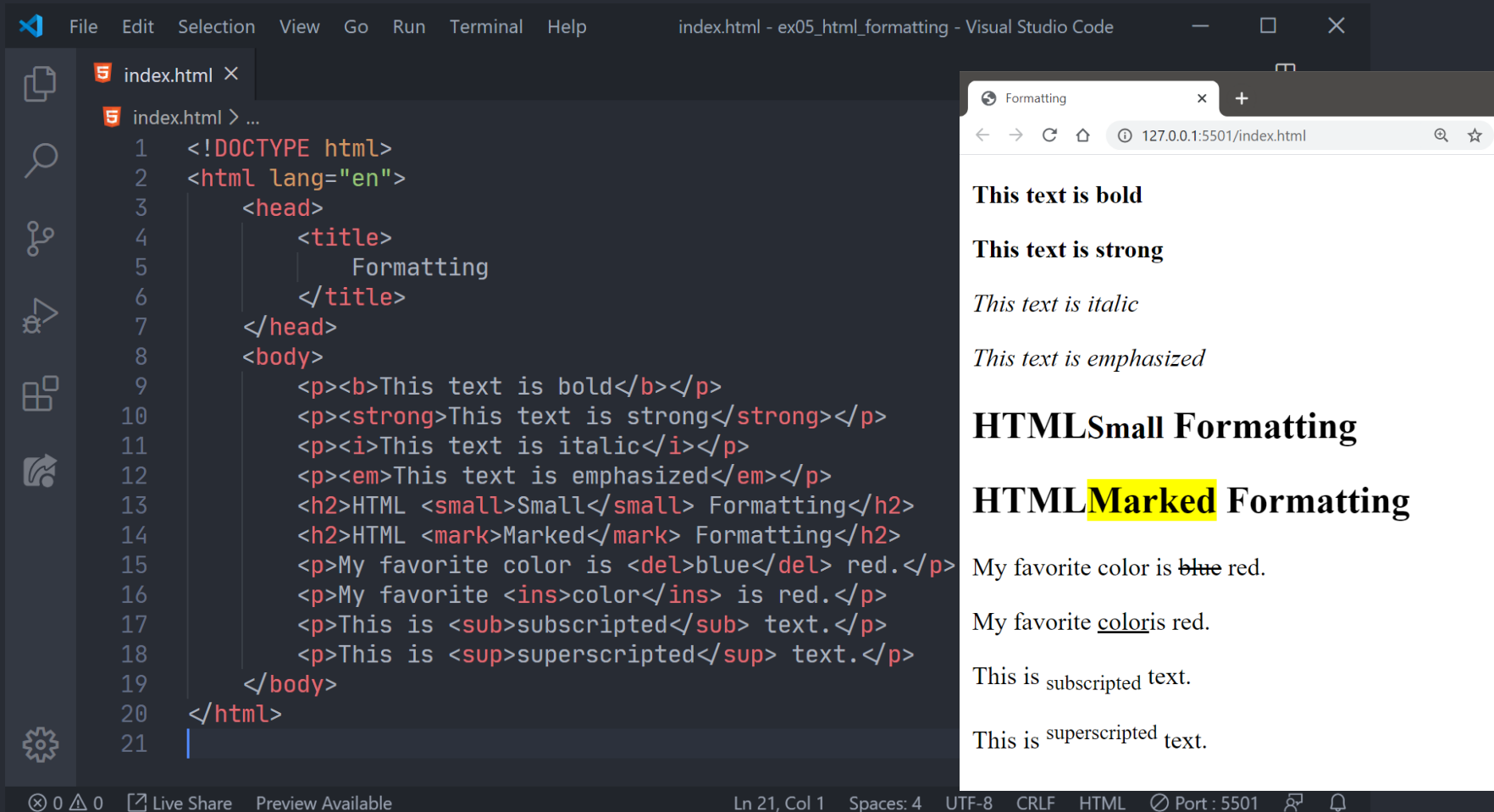
This is the 3rd paragraph

This is
the 4th
paragraph

This is the 5th paragraph This is the 6th paragraph
This is the 7th paragraph

HTML Formatting

- 1) Create a new directory (folder), "ex05_html_formatting"
- 2) Run the VSCode and open the created directory
- 3) Create a webpage file, "index.html" and add the lines of code
- 4) Save the file, run the "Live Server" and check the result in the web browser



The image shows a Visual Studio Code editor window with a file named 'index.html' open. The code is as follows:

```
1 <!DOCTYPE html>
2 <html lang="en">
3   <head>
4     <title>
5       Formatting
6     </title>
7   </head>
8   <body>
9     <p><b>This text is bold</b></p>
10    <p><strong>This text is strong</strong></p>
11    <p><i>This text is italic</i></p>
12    <p><em>This text is emphasized</em></p>
13    <h2>HTML <small>Small</small> Formatting</h2>
14    <h2>HTML <mark>Marked</mark> Formatting</h2>
15    <p>My favorite color is <del>blue</del> red.</p>
16    <p>My favorite <ins>color</ins> is red.</p>
17    <p>This is <sub>subscripted</sub> text.</p>
18    <p>This is <sup>superscripted</sup> text.</p>
19  </body>
20 </html>
21
```

To the right of the editor is a web browser window showing the rendered HTML. The browser address bar shows '127.0.0.1:5501/index.html'. The rendered content is:

This text is bold

This text is strong

This text is italic

This text is emphasized

HTMLSmall Formatting

HTMLMarked Formatting

My favorite color is ~~blue~~ red.

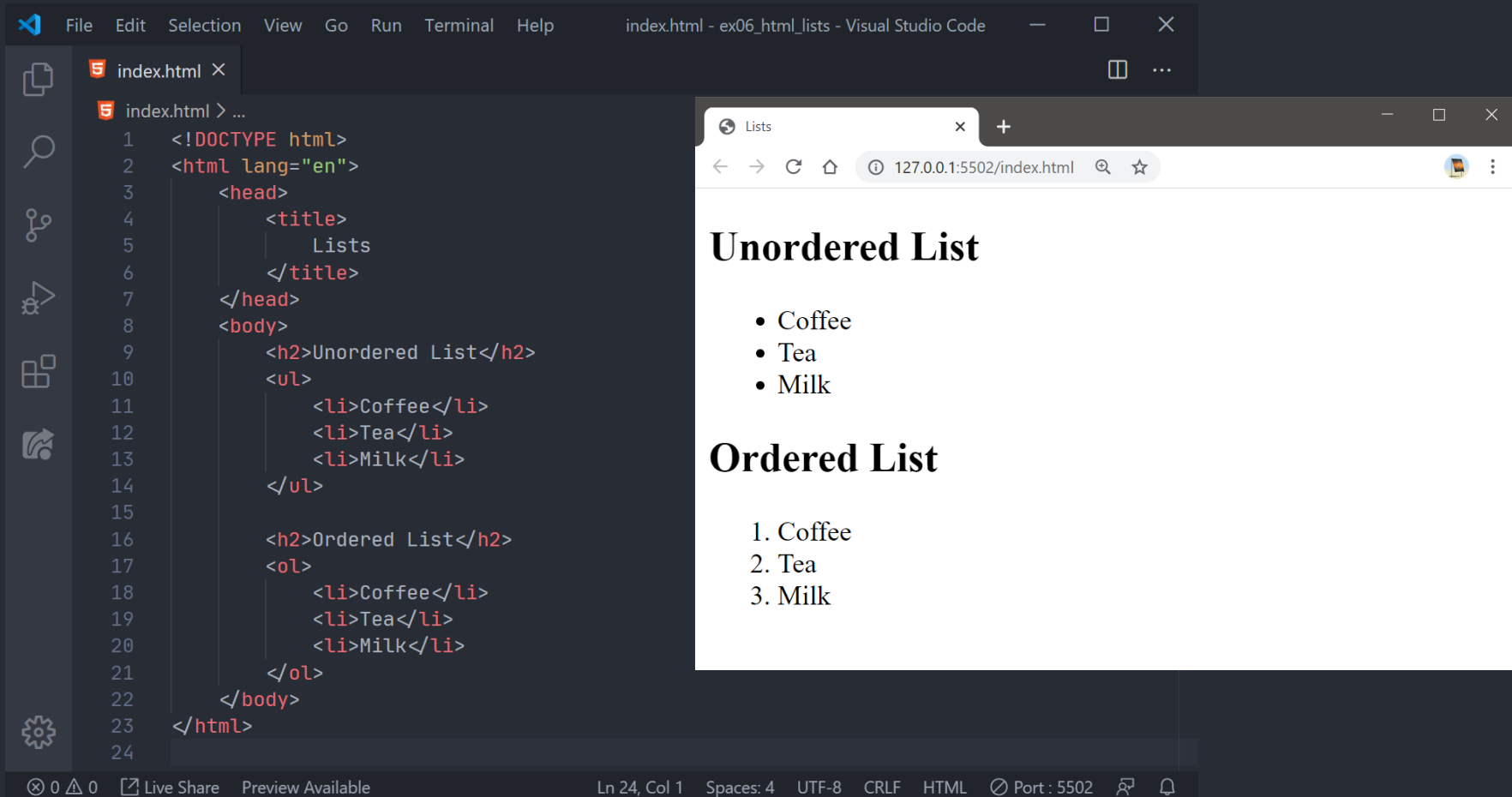
My favorite color is red.

This is subscripted text.

This is superscripted text.

HTML Lists

- 1) Create a new directory (folder), "ex06_html_lists"
- 2) Run the VSCode and open the created directory
- 3) Create a webpage file, "index.html" and add the lines of code
- 4) Save the file, run the "Live Server" and check the result in the web browser



The screenshot shows the Visual Studio Code editor on the left and a web browser on the right. The VS Code editor displays the code for index.html, which includes an HTML document structure with a title 'Lists' and two sections: 'Unordered List' and 'Ordered List'. The web browser shows the rendered output of this code, displaying an unordered list with items 'Coffee', 'Tea', and 'Milk', followed by an ordered list with the same items.

```
1 <!DOCTYPE html>
2 <html lang="en">
3   <head>
4     <title>
5       Lists
6     </title>
7   </head>
8   <body>
9     <h2>Unordered List</h2>
10    <ul>
11      <li>Coffee</li>
12      <li>Tea</li>
13      <li>Milk</li>
14    </ul>
15
16    <h2>Ordered List</h2>
17    <ol>
18      <li>Coffee</li>
19      <li>Tea</li>
20      <li>Milk</li>
21    </ol>
22  </body>
23 </html>
```

Unordered List

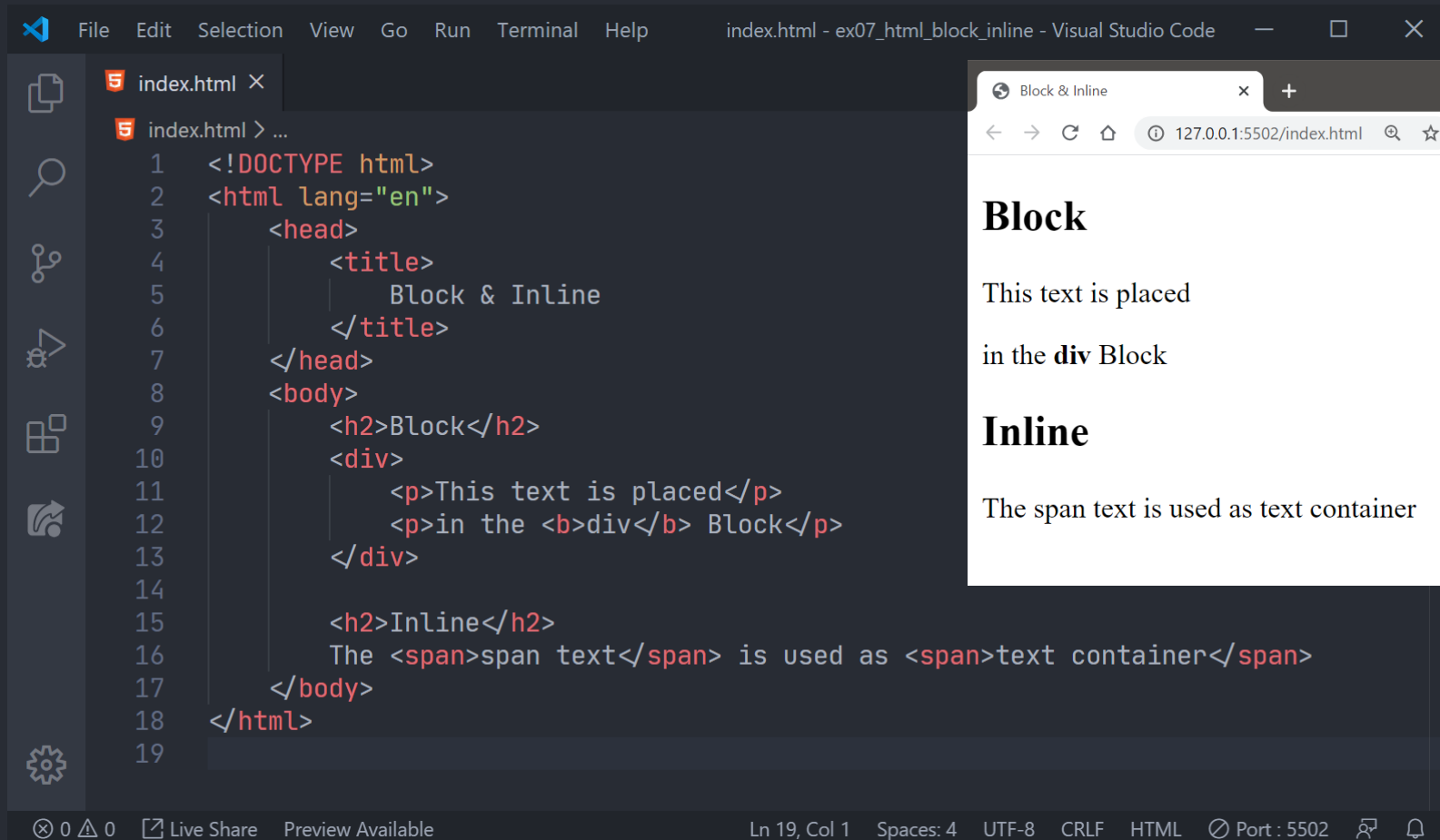
- Coffee
- Tea
- Milk

Ordered List

1. Coffee
2. Tea
3. Milk

HTML Block and Inline Elements

- 1) Create a new directory (folder), "**ex07_html_block_inline**"
- 2) Run the VSCode and open the created directory
- 3) Create a webpage file, "**index.html**" and add the lines of code
- 4) Save the file, run the "**Live Server**" and check the result in the web browser



The screenshot shows the Visual Studio Code editor with a file named `index.html` open. The code is as follows:

```
1 <!DOCTYPE html>
2 <html lang="en">
3   <head>
4     <title>
5       Block & Inline
6     </title>
7   </head>
8   <body>
9     <h2>Block</h2>
10    <div>
11      <p>This text is placed</p>
12      <p>in the <b>div</b> Block</p>
13    </div>
14
15    <h2>Inline</h2>
16    The <span>span text</span> is used as <span>text container</span>
17  </body>
18 </html>
```

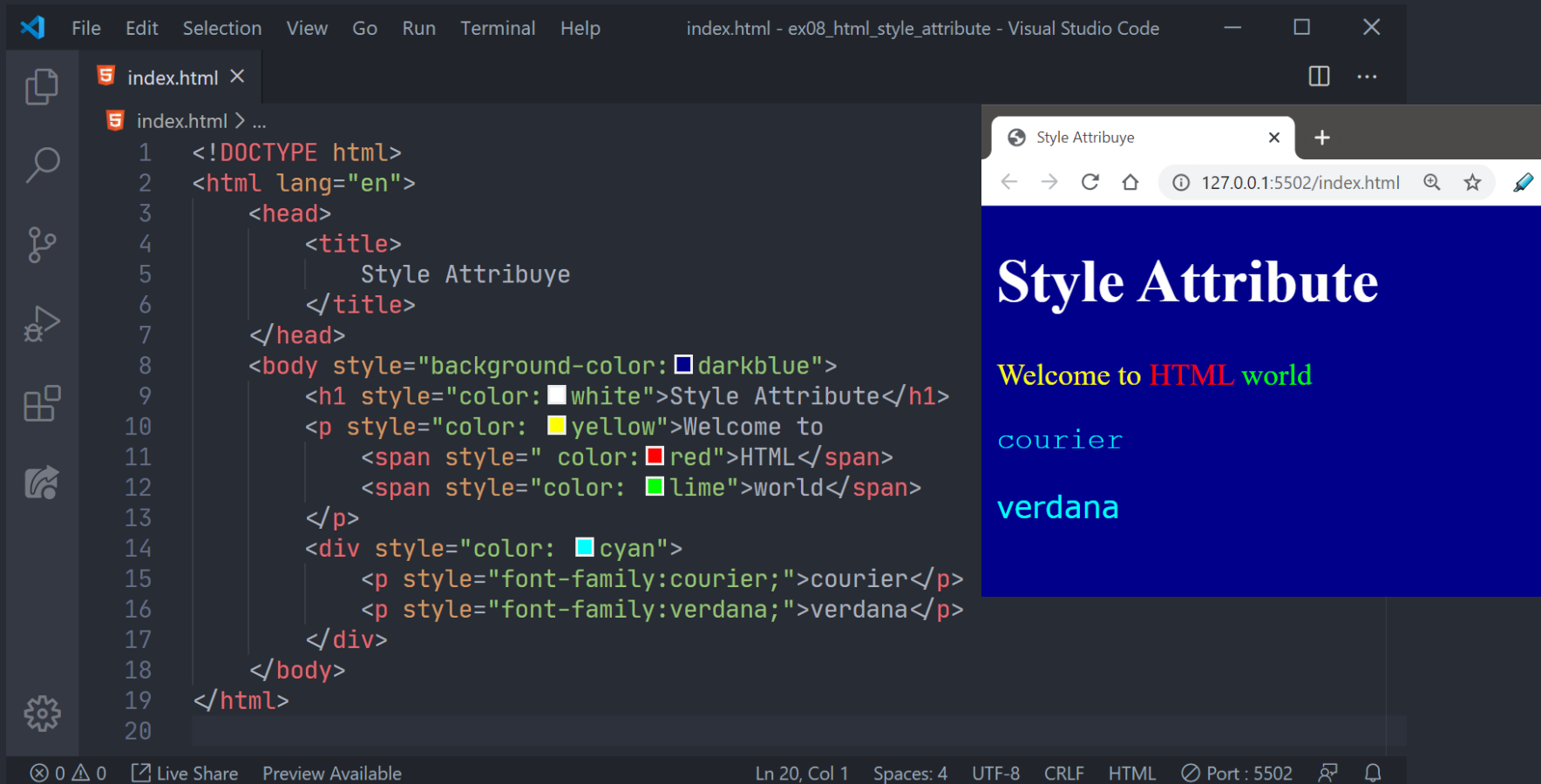
On the right, a web browser window titled "Block & Inline" shows the rendered output. The address bar indicates the URL `127.0.0.1:5502/index.html`. The rendered page displays:

- A heading **Block**.
- A paragraph: "This text is placed in the **div** Block".
- A heading **Inline**.
- A paragraph: "The span text is used as text container".

The status bar at the bottom of VS Code shows "Ln 19, Col 1", "Spaces: 4", "UTF-8", "CRLF", "HTML", and "Port : 5502".

HTML Style Attribute

- 1) Create a new directory (folder), "ex08_html_style_attribute"
- 2) Run the VSCode and open the created directory
- 3) Create a webpage file, "index.html" and add the lines of code
- 4) Save the file, run the "Live Server" and check the result in the web browser



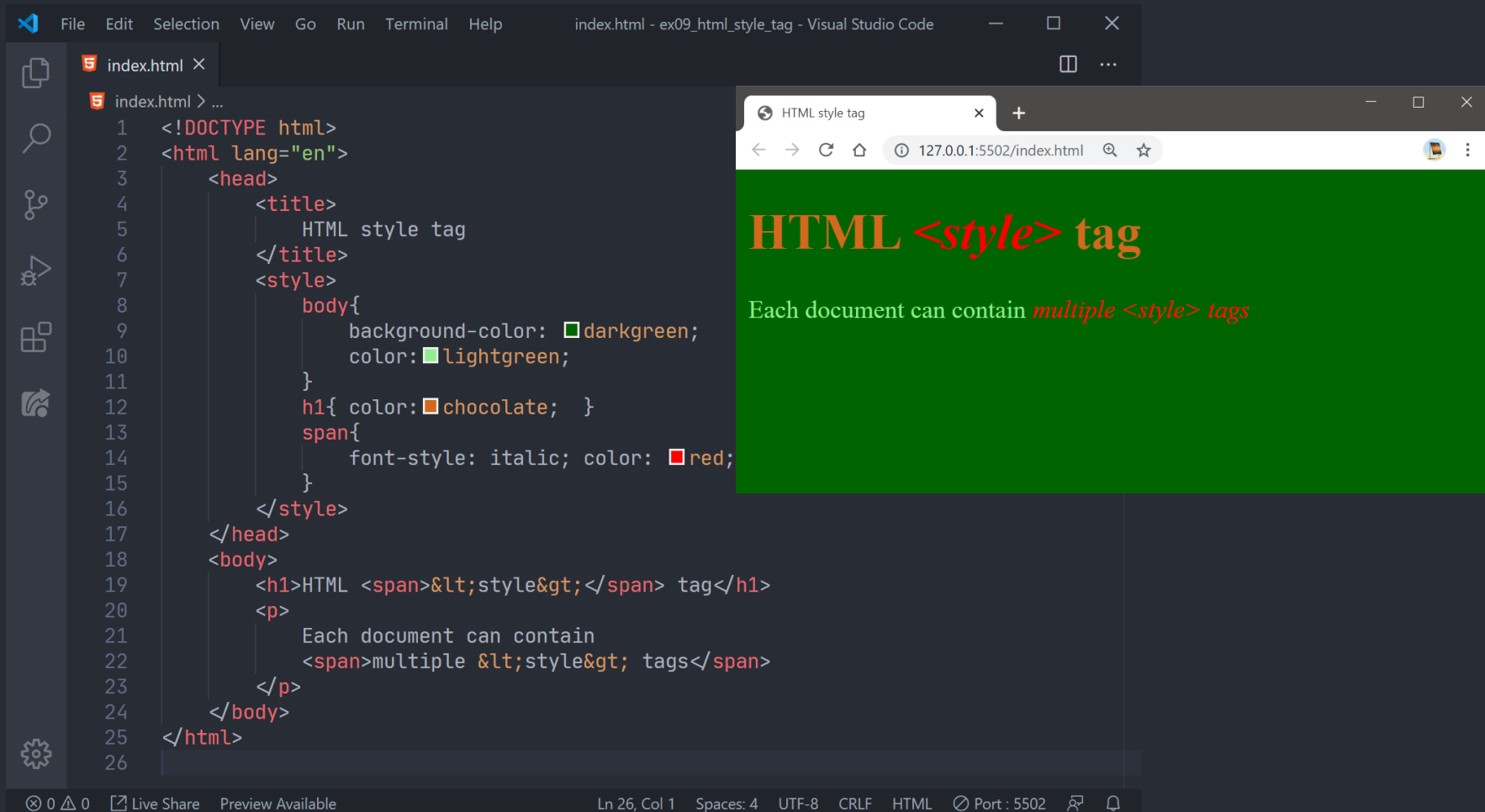
The screenshot shows the Visual Studio Code editor on the left and a web browser on the right. The VS Code editor displays the content of 'index.html' with the following code:

```
1 <!DOCTYPE html>
2 <html lang="en">
3   <head>
4     <title>
5       Style Attribute
6     </title>
7   </head>
8   <body style="background-color: darkblue">
9     <h1 style="color: white">Style Attribute</h1>
10    <p style="color: yellow">Welcome to
11      <span style="color: red">HTML</span>
12      <span style="color: lime">world</span>
13    </p>
14    <div style="color: cyan">
15      <p style="font-family: courier;">courier</p>
16      <p style="font-family: verdana;">verdana</p>
17    </div>
18  </body>
19 </html>
20
```

The web browser on the right shows the rendered output of this code. The page has a dark blue background. The title 'Style Attribute' is displayed in white. The main heading 'Style Attribute' is also in white. The text 'Welcome to' is in yellow, 'HTML' is in red, and 'world' is in lime green. Below this, the word 'courier' is displayed in cyan, and 'verdana' is displayed in cyan. The browser's address bar shows the URL '127.0.0.1:5502/index.html'.

HTML <style> tag

- 1) Create a new directory (folder), "ex09_html_style_tag"
- 2) Run the VSCode and open the created directory
- 3) Create a webpage file, "index.html" and add the lines of code
- 4) Save the file, run the "Live Server" and check the result in the web browser



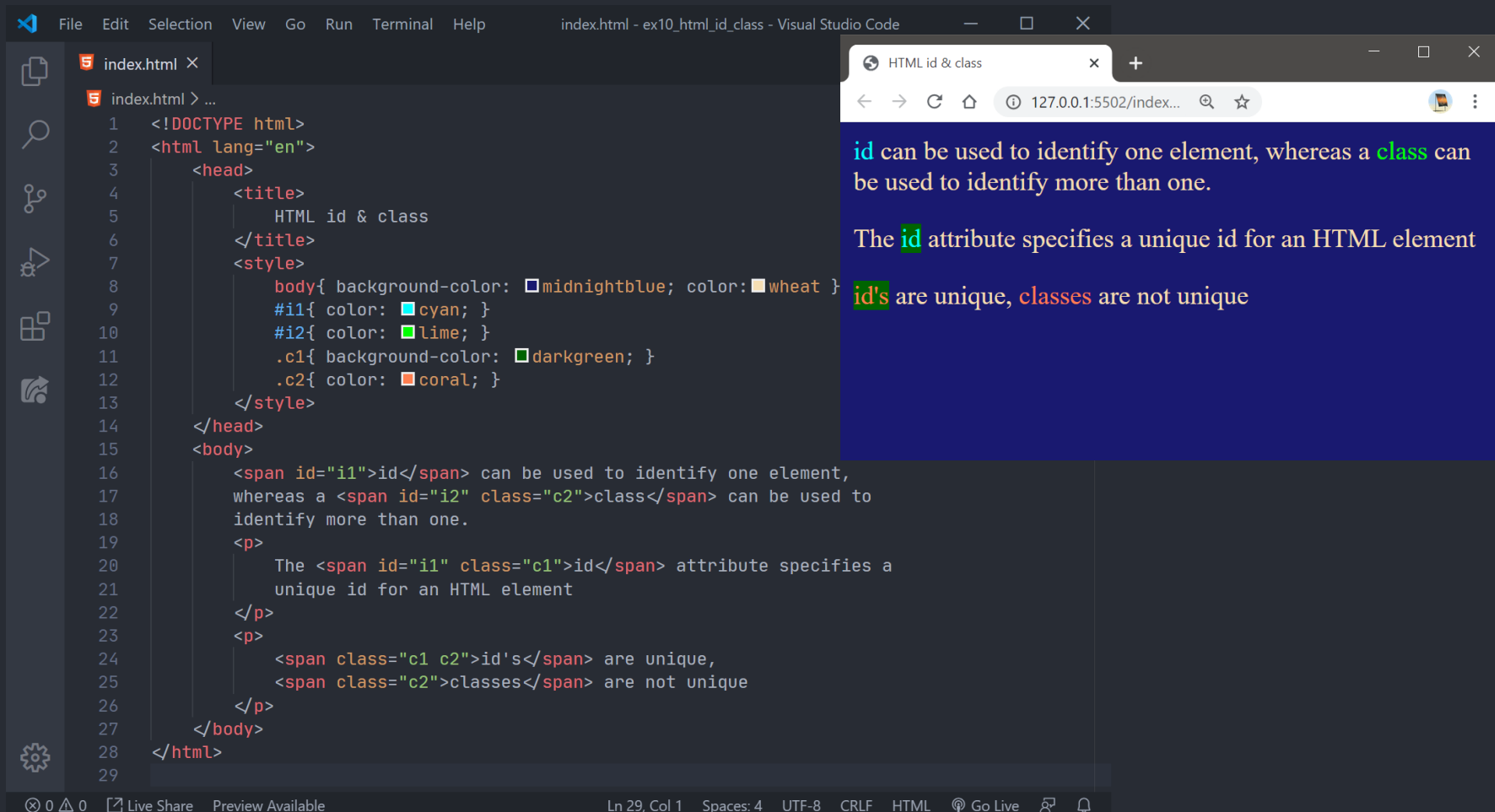
The screenshot shows the Visual Studio Code editor with a file named 'index.html' open. The code is as follows:

```
1 <!DOCTYPE html>
2 <html lang="en">
3   <head>
4     <title>
5       HTML style tag
6     </title>
7     <style>
8       body{
9         background-color: darkgreen;
10        color: lightgreen;
11      }
12      h1{ color: chocolate; }
13      span{
14        font-style: italic; color: red;
15      }
16    </style>
17  </head>
18  <body>
19    <h1>HTML <span>&lt;style&gt;</span> tag</h1>
20    <p>
21      Each document can contain
22      <span>multiple &lt;style&gt; tags</span>
23    </p>
24  </body>
25 </html>
```

The web browser (Chrome) displays the rendered page. The background is dark green, and the text is light green. The title is 'HTML style tag'. The main heading is 'HTML <style> tag' in chocolate color. The paragraph text is 'Each document can contain multiple <style> tags' in red, italicized font.

HTML id and class

- 1) Create a new directory (folder), "**ex10_html_id_class**"
- 2) Run the VSCode and open the created directory
- 3) Create a webpage file, "**index.html**" and add the lines of code
- 4) Save the file, run the "**Live Server**" and check the result in the web browser



The screenshot shows the Visual Studio Code editor with a file named `index.html` open. The code defines an HTML document with a title "HTML id & class" and a style block. The style block includes a body background color of midnightblue, and specific colors for elements with IDs #i1 (cyan) and #i2 (lime), and classes .c1 (darkgreen) and .c2 (coral). The body contains two paragraphs explaining the use of id and class attributes, and two spans demonstrating these attributes.

The web browser (Chrome) displays the rendered page. The title is "HTML id & class". The first paragraph explains that `id` identifies one element and `class` identifies more than one. The second paragraph states that `id` attributes are unique, while `classes` are not. The spans in the code are rendered with the specified colors: the first span is cyan, the second is lime, the third is darkgreen, and the fourth is coral.

```
1 <!DOCTYPE html>
2 <html lang="en">
3   <head>
4     <title>
5       HTML id & class
6     </title>
7     <style>
8       body{ background-color: midnightblue; color: wheat; }
9       #i1{ color: cyan; }
10      #i2{ color: lime; }
11      .c1{ background-color: darkgreen; }
12      .c2{ color: coral; }
13    </style>
14  </head>
15  <body>
16    <span id="i1">id</span> can be used to identify one element,
17    whereas a <span id="i2" class="c2">class</span> can be used to
18    identify more than one.
19    <p>
20      The <span id="i1" class="c1">id</span> attribute specifies a
21      unique id for an HTML element
22    </p>
23    <p>
24      <span class="c1 c2">id's</span> are unique,
25      <span class="c2">classes</span> are not unique
26    </p>
27  </body>
28 </html>
```

HTML id & class

id can be used to identify one element, whereas a class can be used to identify more than one.

The id attribute specifies a unique id for an HTML element

id's are unique, classes are not unique

HTML and CSS

Learn HTML
Learn CSS
Learn Bootstrap
Learn W3.CSS
Learn Colors
Learn Icons
Learn Graphics
Learn How To
Learn Sass

JavaScript

Learn JavaScript
Learn jQuery
Learn React
Learn AngularJS
Learn JSON
Learn AJAX
Learn W3.JS

Server Side

Learn SQL
Learn PHP
Learn ASP
Learn Node.js
Learn Raspberry Pi

Programming

Learn Python
Learn Java
Learn C++

HTML

The language for building web pages

[LEARN HTML](#)[HTML REFERENCE](#)

HTML Example:

```
<!DOCTYPE html>
<html>
<title>HTML Tutorial</title>
<body>

<h1>This is a heading</h1>
<p>This is a paragraph.</p>

</body>
</html>
```

[Try it Yourself »](#)

CSS Example:

```
body {
  background-color: lightblue;
}

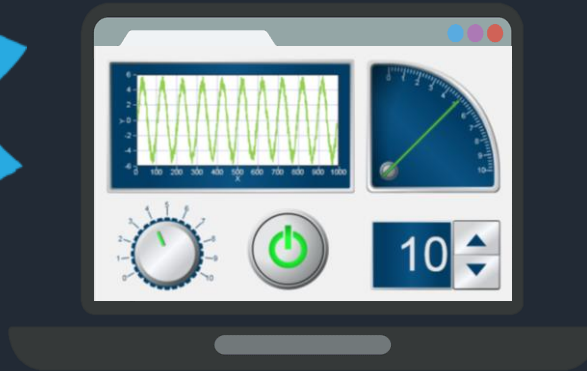
h1 {
  color: white;
  text-align: center;
}
```

CSS

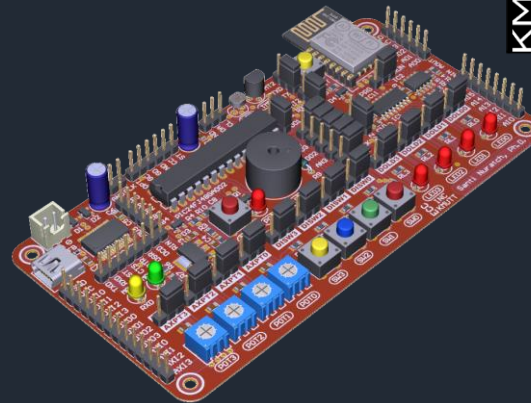
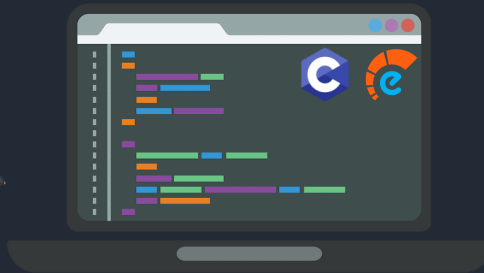
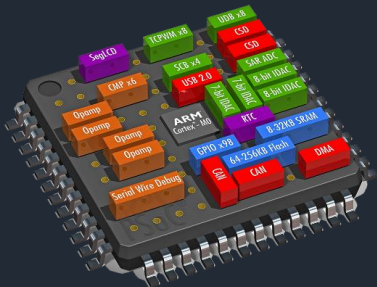
The language for styling web pages

[LEARN CSS](#)[CSS REFERENCE](#)

THANK YOU!



We Make Computers do More



Asst.Prof.Dr.Santi Nuratch

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King Mongkut's University of Technology Thonburi, **KMUTT**