Software Studio
軟體設計與實驗

HTML5

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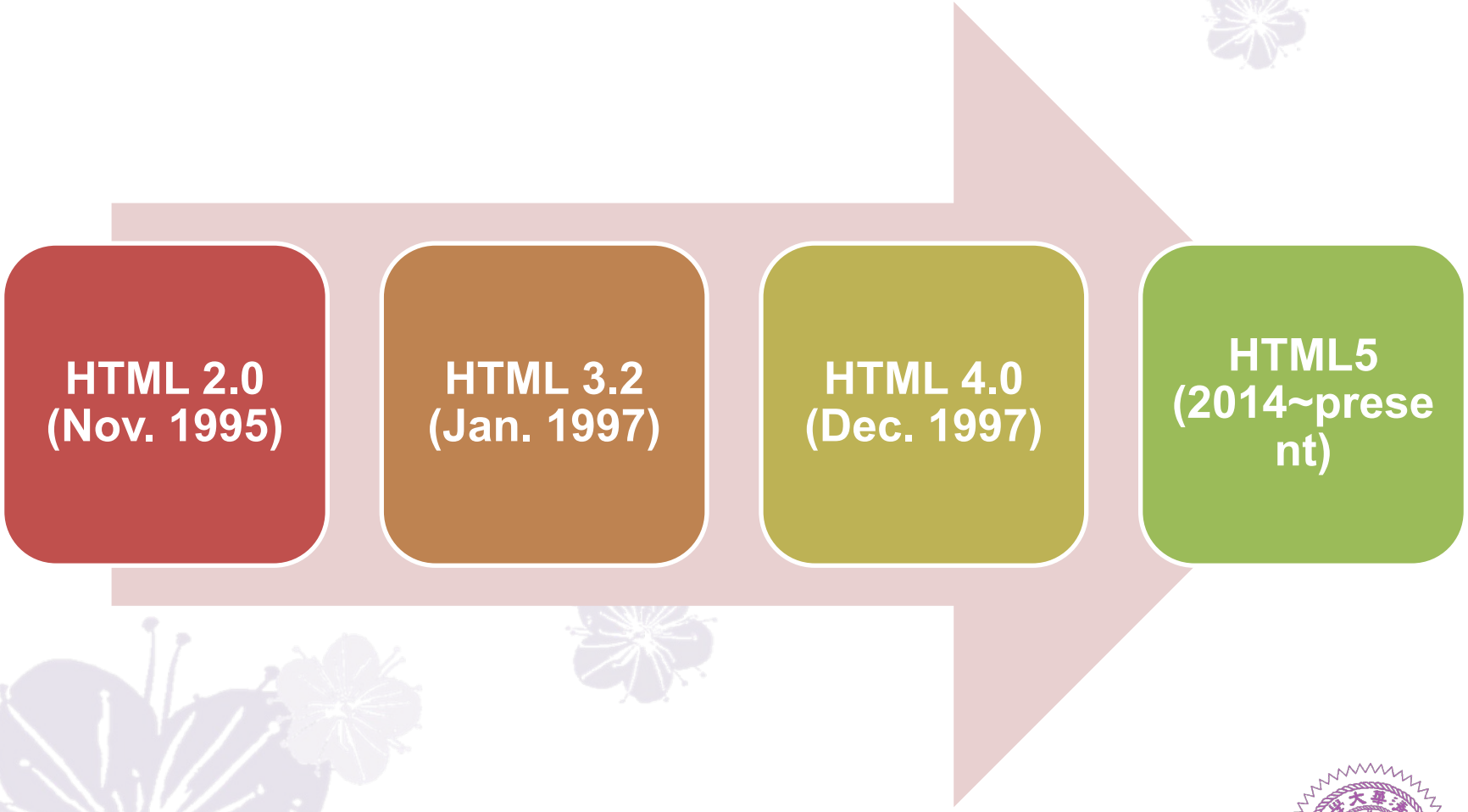
HTML

What is HTML?

- **H**yper**T**ext **M**arkup **L**anguage by W3C.
- The standard **markup language** for creating **web pages** and **web applications**.
- **Web browsers** receive HTML documents from a **web server** or from **local storage** and render them into multimedia web pages.
- HTML describes the **structure** as well as **appearance** of a web page via a pre-defined set of **tags** and **attributes.**

HTML History



Editing HTML5

- A HTML5 file is simply a text file, so we can edit it with any kind of editor.
  - We use **Visual Studio Code** in this course!
- A HTML5 file can be created by naming the file **xxx.html** or **xxx.htm**. Open the file with browsers to view the content.

Visual Studio Code

<!DOCTYPE>

- Start a html file with this declaration so the browsers show the content correctly. (**can only be declared once**)

```
<!DOCTYPE html>
```

HTML5 Comments

- We comment codes in HTML5 as follows:

```
<!--  comment -->
```

- Browsers neglect whatever content is in it.

HTML5 Tags

- HTML structures a web page with tags.
- Tags come in pairs:
  - **Opening** tag and **ending** tag.
- Different tags represent different elements.

<tag> content </tag>

HTML5 Page structure

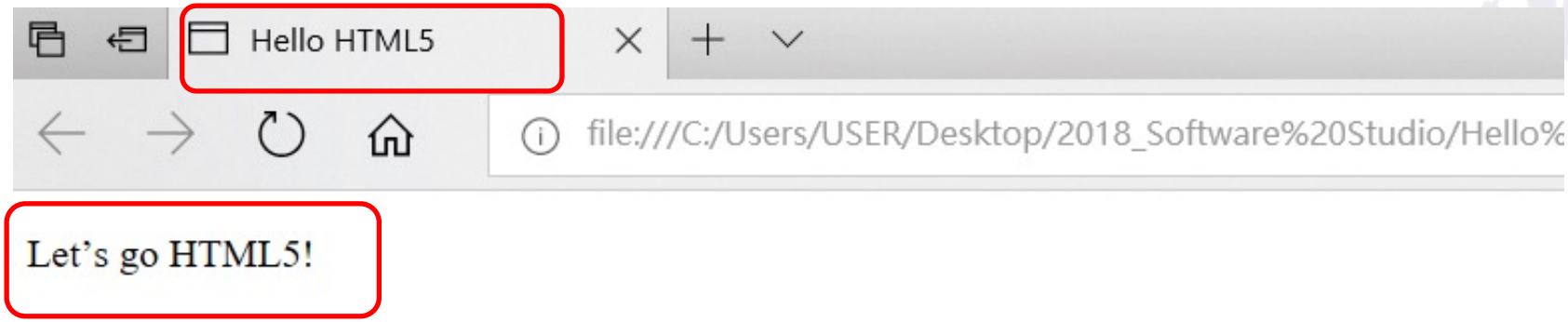
```
<!DOCTYPE html>
<html>
    <head>
        <!-- metadata -->
        <meta charset = “utf-8”>
        <title>Hello HTML5</title>
    </head>
    <body>
        <!-- content -->
        <p>Let’s go HTML5!</p>
    </body>
</html>
```

Basic Elements

- A **<html></html>** tag is the container for all the other HTML elements. (except for <!DOCTYPE> tag)
  - **<head>**
    - contains all the information needed in this HTML file
    - <meta charset = “utf-8”> specifies the character encoding
    - <title> is the title of the web page
  - **<body>**
    - all the content to be display

W3School reference: HTML - Elements

Page title



Display content

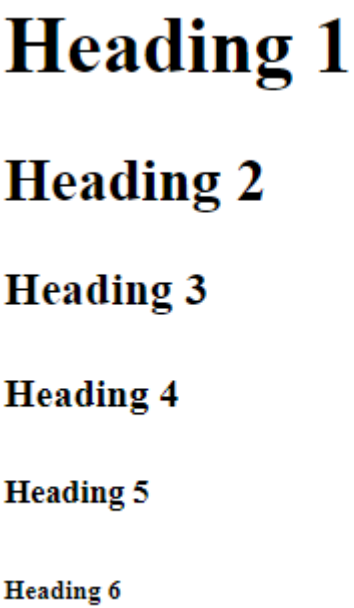
Block and Inline Elements

- Elements in HTML5 are displayed in 2 ways:
  - **Block** Elements
    - Always start on a **new line**
    - Take up the full width of the page
    - <h1>~<h6>,<p>,<li>,<figure>, ,<form>, etc.
  - **Inline** Elements
    - **Do not cause a line break**
    - Takes only the places surrounded by the tags
    - <a>,
,<img>,<button>,<label>,, etc.

Headings

- There are 6 heading elements **<h1> ~ <h6>.**

```
<!DOCTYPE html>
<html>
   <head>
      <meta charset = “utf-8”>
      <title>Heading</title>
   </head>
   <body>
      <h1>Heading 1</h1>
      <h2>Heading 2</h2>
      <h3>Heading 3</h3>
      <h4>Heading 4</h4>
      <h5>Heading 5</h5>
      <h6>Heading 6</h6>
   </body>
</html>
```



W3School reference: HTML - Heading

Paragraphs

- Use ** ** to create a paragraph.

```
<!DOCTYPE html>
<html>
    <head>
        <meta charset = "utf-8">
        <title>Paragraph</title>
    </head>
    <body>
        <p>This is paragraph 1</p>
        <p>Another Paragraph 2</p>
    </body>
</html>
```

This is paragraph 1

Another Paragraph 2

W3School reference: HTML - Paragraphs

Formatting

- Use special elements to **define formatting output.**
  - <b>, , <i>, etc.
  - These tags are for texts (e.g., <p>)

```
<p>It's normal text</p>
<p><b>It's bold text</b></p>
<p><i>It's Italic text</i></p>
<p><strong>It's important text</strong></p>
```

It's normal text

It's bold text

It's Italic text

It's important text

W3School reference: HTML – Formatting

Entities

- Use character entities to replace the reserved characters in HTML.
  - **>**, **<**, **&**, **“**, etc.
  - To display them we must write **&entity_name**, **&entity_number**.

W3School reference: HTML – Entities

Line Break

- Use **
** to start a new line.
- **
** is a single tag. (no ending tag)

```
<!DOCTYPE html>
<html>
  <head>
    <meta charset = "utf-8">
    <title>Line Break</title>
  </head>
  <body>
    <p>
      Hypertext Markup Language (HTML) <br>
      is the standard markup language <br>
      for creating web pages and web applications.
    </p>
  </body>
</html>
```

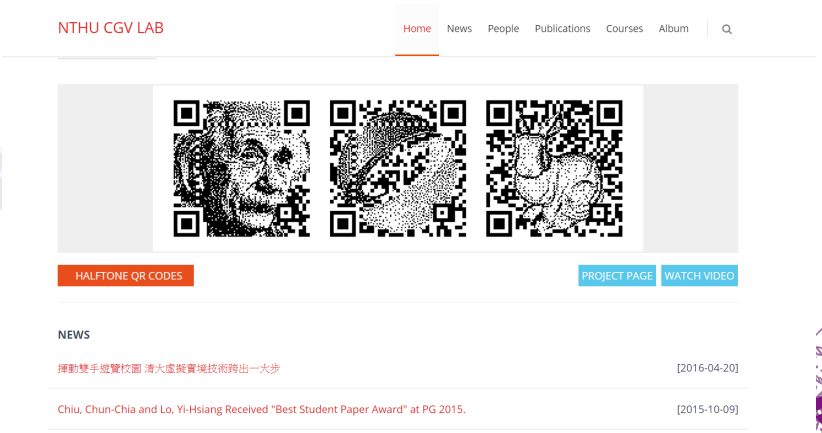
Hypertext Markup Language (HTML)
is the standard markup language
for creating web pages and web applications.

Links

- Use **<a>** with an '**href**' attribute to make a link.

```
<a href="http://cgv.cs.nthu.edu.tw/">CGVLab Website</a>
```

CGVLab Website



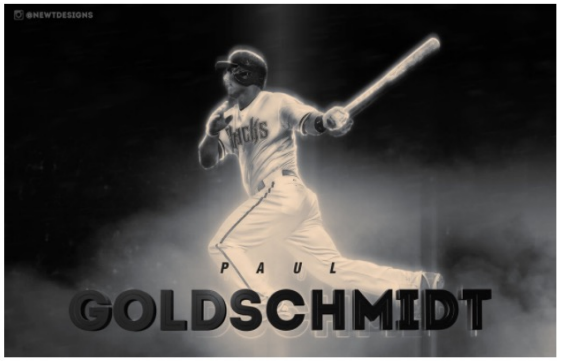
W3School reference: HTML – Links

Images

- Use **<img>** to display an image.
  - 'src': determine the source of an image
  - 'width', 'height': determine the size of an image.
  - 'alt': alternate text when the image is not showing

```
<img src="Paul.jpg" alt="Paul" width="500" height="320">
```

Paul 2017/11/9 上午 0... JPG 檔案 74 KB



W3School reference: HTML – Images

HTML Attributes

- Attributes provide additional information about HTML.
  - 'href' of <a> tags
  - 'src', 'alt', 'width' and 'height' of a <img> tag.
- CSS **style attribute** can also set the style of an HTML element.
  - background-image, list-style-type, etc.
  - HTML controls the absolute size of an element. Use CSS to control the relative size. This will be discussed in detail in the next CSS lecture.

Background Image

- Use CSS style attribute's **background-image** to change background images.
- Add "style" attribute to tags to change the background image of the area surrounded by them.
  - url('') specifies the source of the image.
- Add the attribute to <body> to change the background of whole page.

```
<body style = "backgroung-image:url('bg.jpg')"></body>
```

W3School reference: HTML - Background Images

List

- There are ordered and unordered list in HTML5, which determines whether the icons are in number order or not.
  - **
** : an ordered list
  - **
** : an unordered list
  - **
** : a list item

W3School reference: HTML – Lists

Choose List Item Marker

- Use CSS list-style-type to define the icon of an **unordered** list.

```
<ul style = “list-style-type:value”></ul>
```

Value	Description
disc	Sets the list item marker to a bullet (default)
circle	Sets the list item marker to a circle
square	Sets the list item marker to a square
none	The list items will not be marked

```
<!DOCTYPE html>
<html>
<head>
    <meta charset = "utf-8">
    <title>List</title>
</head>
<body>
    <h2>Ordered HTML list</h2>

    <ol>
        <li>One</li>
        <li>Two</li>
        <li>Three</li>
    </ol>

    <h2>Unordered HTML List</h2>

    <ul style="list-style-type:circle">
        <li>Coffee</li>
        <li>Tea</li>
        <li>Milk</li>
    </ul>
</body>
</html>
```

Ordered HTML list

1. One
2. Two
3. Three

Unordered HTML List

- Coffee
- Tea
- Milk

Nested List

- List can be nested.

```
<h2>Nested list</h2>
    <ul>
        <li>Ordered List
            <ol>
                <li>One</li>
                <li>Two</li>
                <li>Three</li>
            </ol>
        </li>
        <li>Unordered List
            <ul style="list-style-type:circle">
                <li>Coffee</li>
                <li>Tea</li>
                <li>Milk</li>
            </ul>
        </li>
    </ul>
```

Nested list

- Ordered List
  1. One
  2. Two
  3. Three
- Unordered List
  - Coffee
  - Tea
  - Milk

Table

- Use **<table></table>** to create a HTML table. A table is composed of 3 elements:
  - <tr></tr> defines a row
  - <th></th> defines a table header of a row or a column
  - <td></td> defines a cell
- Use CSS style
  - border, align, color, etc.

W3School reference: HTML – Tables

```
<table>
    <tr>
        <th>Name</th>
        <th>gender</th>
        <th>Age</th>
    </tr>
    <tr>
        <td>Steven</td>
        <td>male</td>
        <td>23</td>
    </tr>
    <tr>
        <td>Eric</td>
        <td>male</td>
        <td>22</td>
    </tr>
    <tr>
        <td>Roger</td>
        <td>male</td>
        <td>23</td>
    </tr>
    <tr>
        <td>Alice</td>
        <td>male</td>
        <td>23</td>
    </tr>
</table>
```

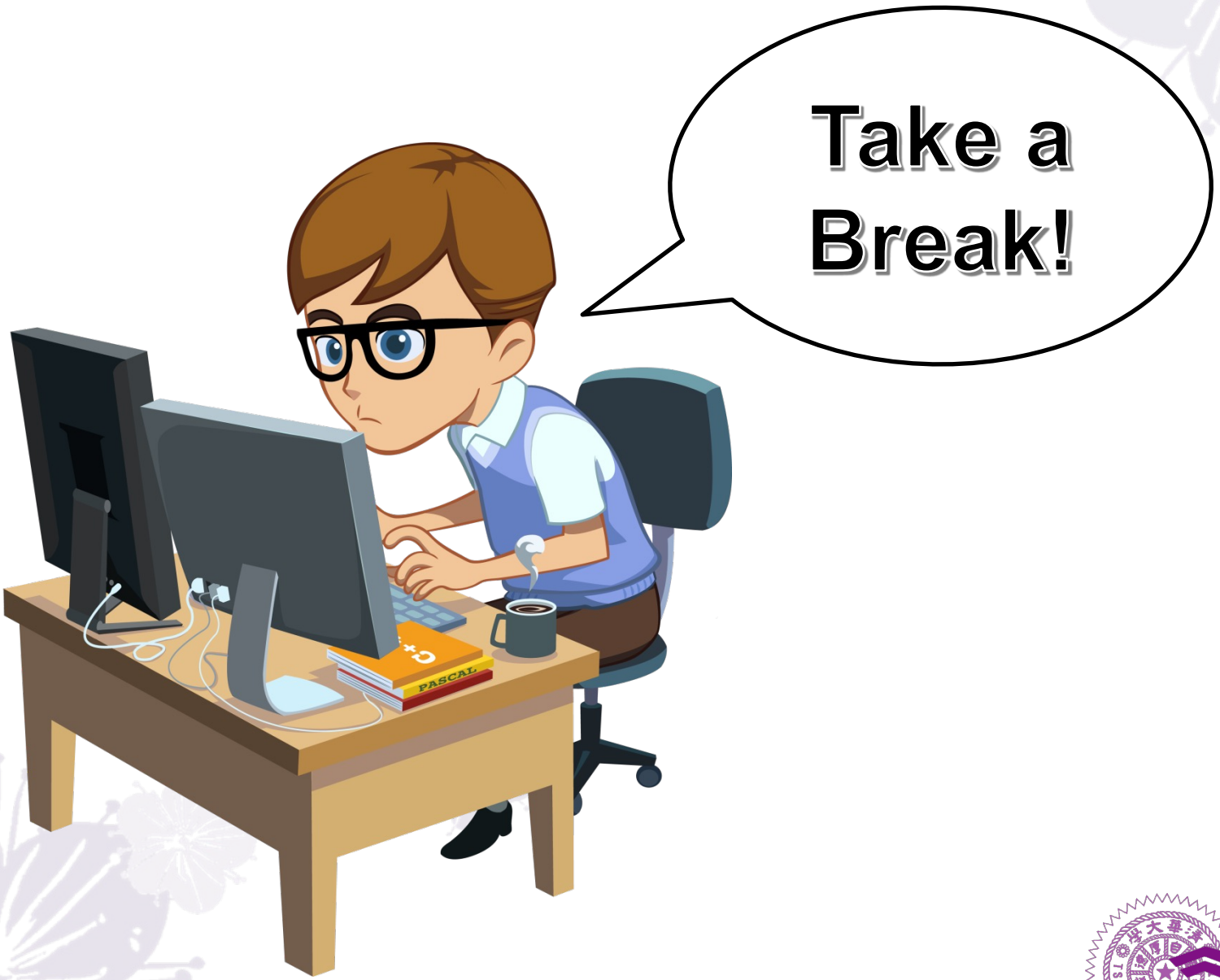
Name	gender	Age
Steven	male	23
Eric	male	22
Roger	male	23
Alice	male	23

Spanning Rows and Columns

- Use '**rowspan**' and '**colspan**' to make a cell span more than one row / column.

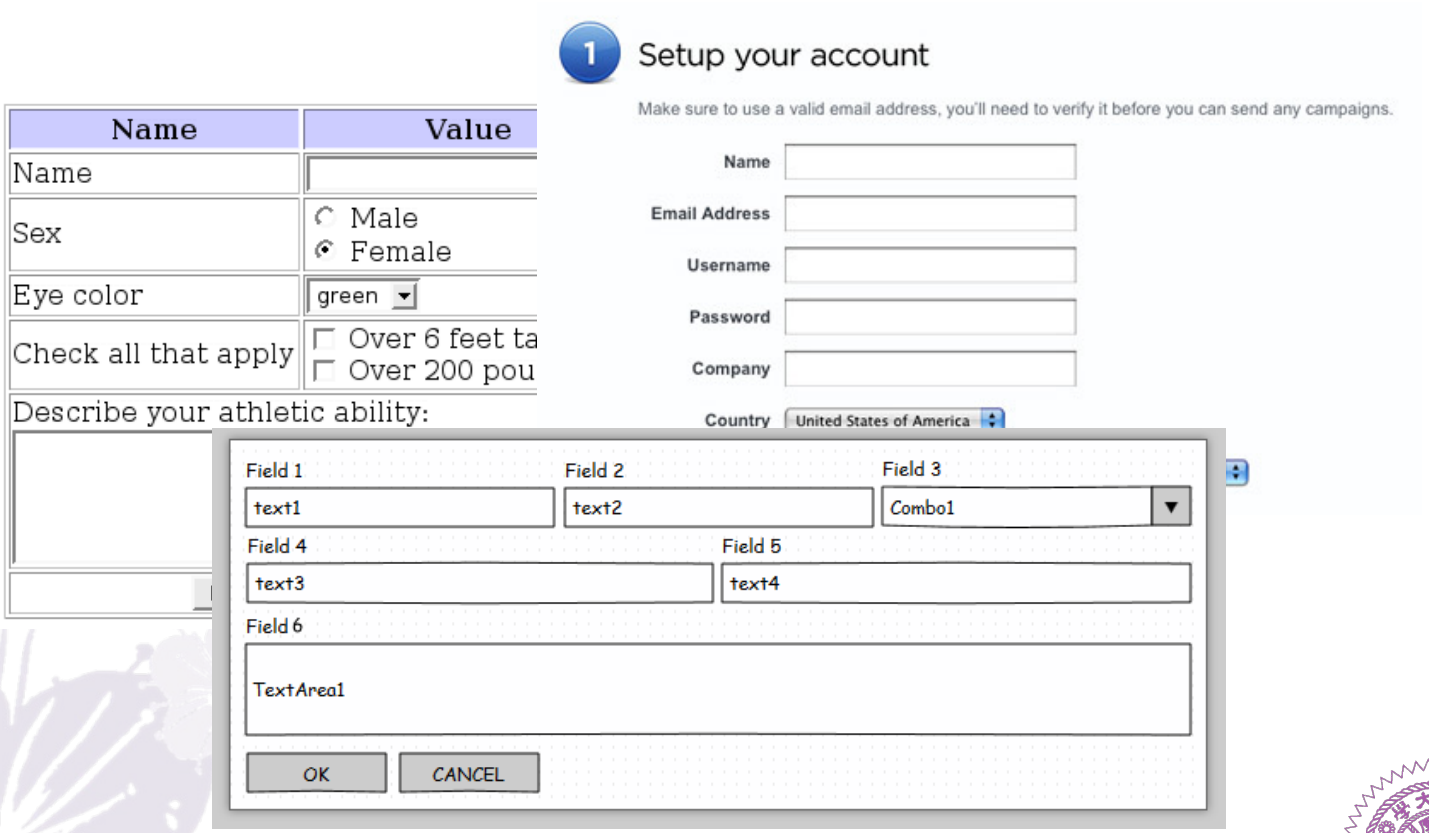
```
<table>
    <tr>
        <th>Name</th>
        <th colspan="4">profile</th>
    </tr>
    <tr>
        <td>Steven</td>
        <td>male</td>
        <td>23 years old</td>
        <td>183cm</td>
        <td>75kg</td>
    </tr>
    <tr>
        <td>Eric</td>
        <td>male</td>
        <td>22 years old</td>
        <td>180cm</td>
        <td>100kg</td>
    </tr>
</table>
```

Name	profile			
Steven	male	23 years old	183cm	75kg
Eric	male	22 years old	180cm	100kg

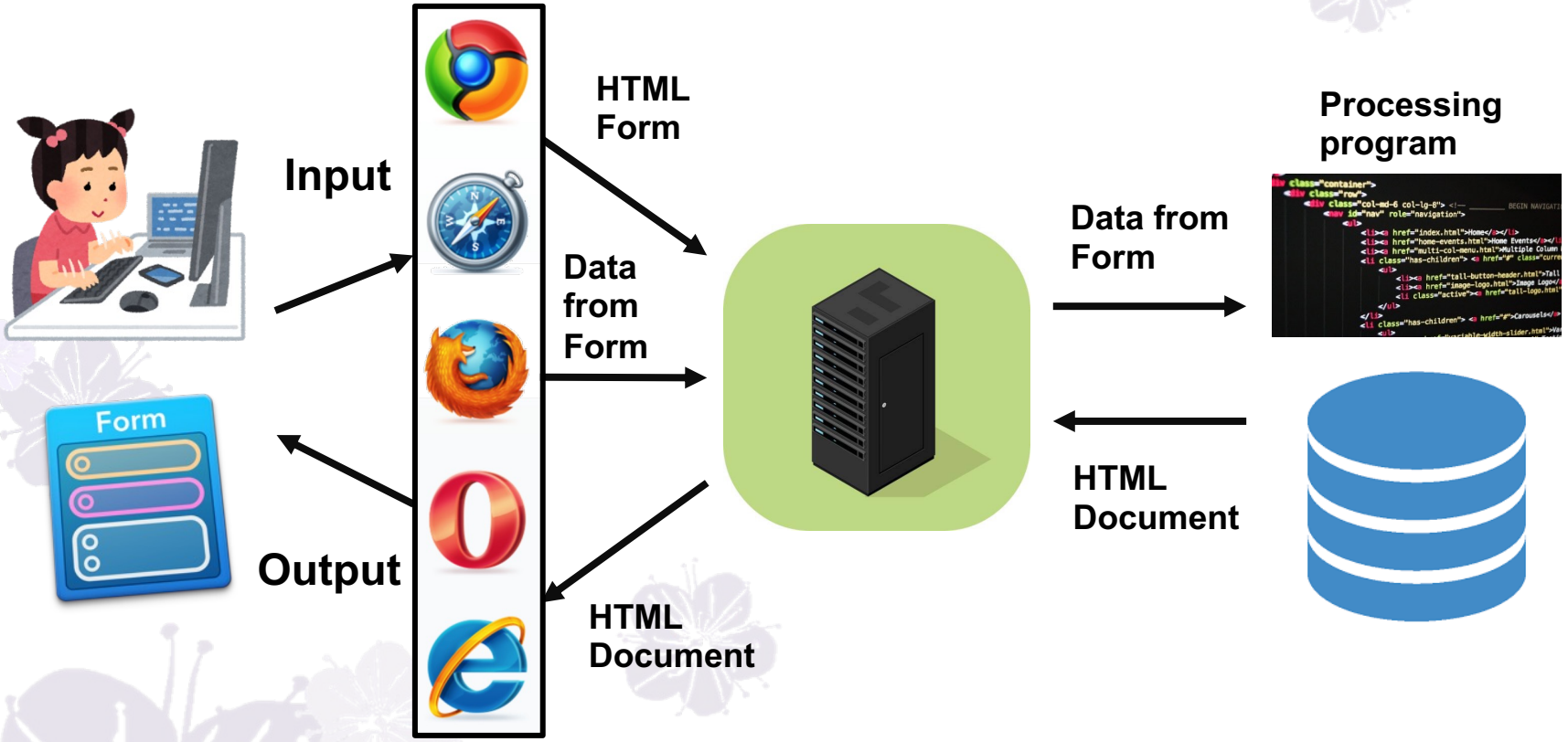

Take a
Break!
C++
PASCAL

Let's talk about Form

User interaction in HTML!



Form Processing



Web Communication with Server

- **H**yper**T**ext **T**ransfer **P**rotocol (**HTTP**)
  - protocols specify how machines communicate
- HTTP specifies how browsers communicate with web servers
- 2 kinds of HTTP messages : **request** and **response**
  - Requests access data in the servers (GET, POST, DELETE, etc.)
  - Responses are what servers respond (200 OK, 404 Not Found, etc.)

Form

- Use HTML5 **<form></form>** to gather user input.
- HTML form interacts with users without the help of JavaScript.
- A form is composed of many input widgets
  - Text boxes, buttons, checkboxes, etc.
- The main difference between common HTML file and a HTML form is that it send the input data to web servers.
- Since we have not learned server-side programming yet, we only discuss how we get user input here, but not how servers process the data.

W3School reference: HTML – Forms

Form (Cont'd)

- Use **<form></form>** to create a form.
  - 'action' specifies the server-side webpage which form data is going to be sent to after the submission. (e.g., php)
  - 'method' determines the method HTTP uses to send data. (POST or GET, mostly POST)

```
<form action="/myForm.php" method="post">
  ……
</form>
```

W3School reference: HTML – Request Methods

When to use GET?

- The default method when submitting form data is GET.
- The submitted form data will be visible in the page address field:
  - /action_page.php?firstname=Mickey&lastname=Mouse
- Notes:
  - The length of a URL is limited (about 3000 characters)
  - Never use GET to send sensitive data! (will be visible in the URL)
  - Useful for form submissions where a user wants to bookmark the result
  - GET is better for non-secure data, like query strings in Google

淺談 HTTP Method : 表單中的GET與POST有什麼差別?

When to use POST?

- Always use POST if the form data contains sensitive or personal information.
- The POST method does not display the submitted form data in the page address field.
- Notes:
  - POST has no size limitations and can be used to send large amounts of data.
  - Form submissions with POST cannot be bookmarked

淺談 HTTP Method : 表單中的GET與POST有什麼差別?

The <input> Element

- **<input>** is an important element to a form.
- Common Input Element
  - text : one-line input text box
  - password : input text box for password
  - radio : single choice buttons
  - submit : submit button (submit the form)

W3School reference: HTML – Form Elements

Text Input

- ‘value’ determines the initial content of the text box.

```
<body>
<form action="/myForm.php" method="post">
    Your account:<br>
    <input type=“text” name=“account” value=“Jack”><br>
    Your password:<br>
    <input type=“text” name=“password” value=“1234”><br>
</form>
</body>
```

Your account:

Jack

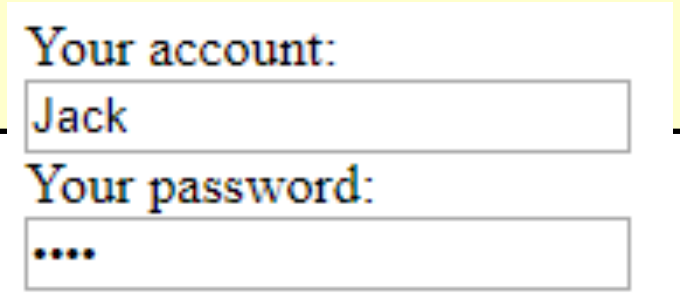
Your password:

1234

Password Input

- The password input element defines a password field, where **characters are masked**.

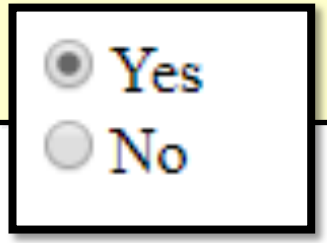
```
<body>
<form action="/myForm.php" method="post">
    Your account:<br>
    <input type="text" name="account" value="Jack"><br>
    Your password:<br>
    <input type="password" name="password" value="1234"><br>
</form>
</body>
```



Radio Button Input

- 'value' is the value of the button, which is also the value to be sent to the server.
- 'checked' determines the default choice.

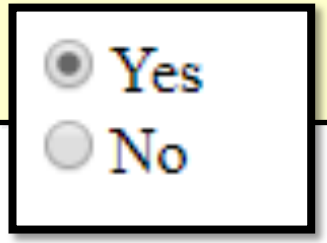
```
<body>
<form action="/myForm.php" method="post">
   <input type="radio" name="select" value="yes" checked>Yes<br>
   <input type="radio" name="select" value="no">No<br>
</form>
</body>
```



Radio Button Input

- Only one button in a radio group (radio buttons of the same name) can be selected at the same time.

```
<body>
<form action="/myForm.php" method="post">
   <input type="radio" name="select" value="yes" checked>Yes<br>
   <input type="radio" name="select" value="no">No<br>
</form>
</body>
```



Submit Button

- Form data is sent to a server page when a **submit button** is clicked.
- server page is defined with 'action'
  - **Only inputs with 'name' attribute will be submitted.**
  - 'value' determines the text on the button

```
<input type="submit" value="Submit">
```

Other Input Types

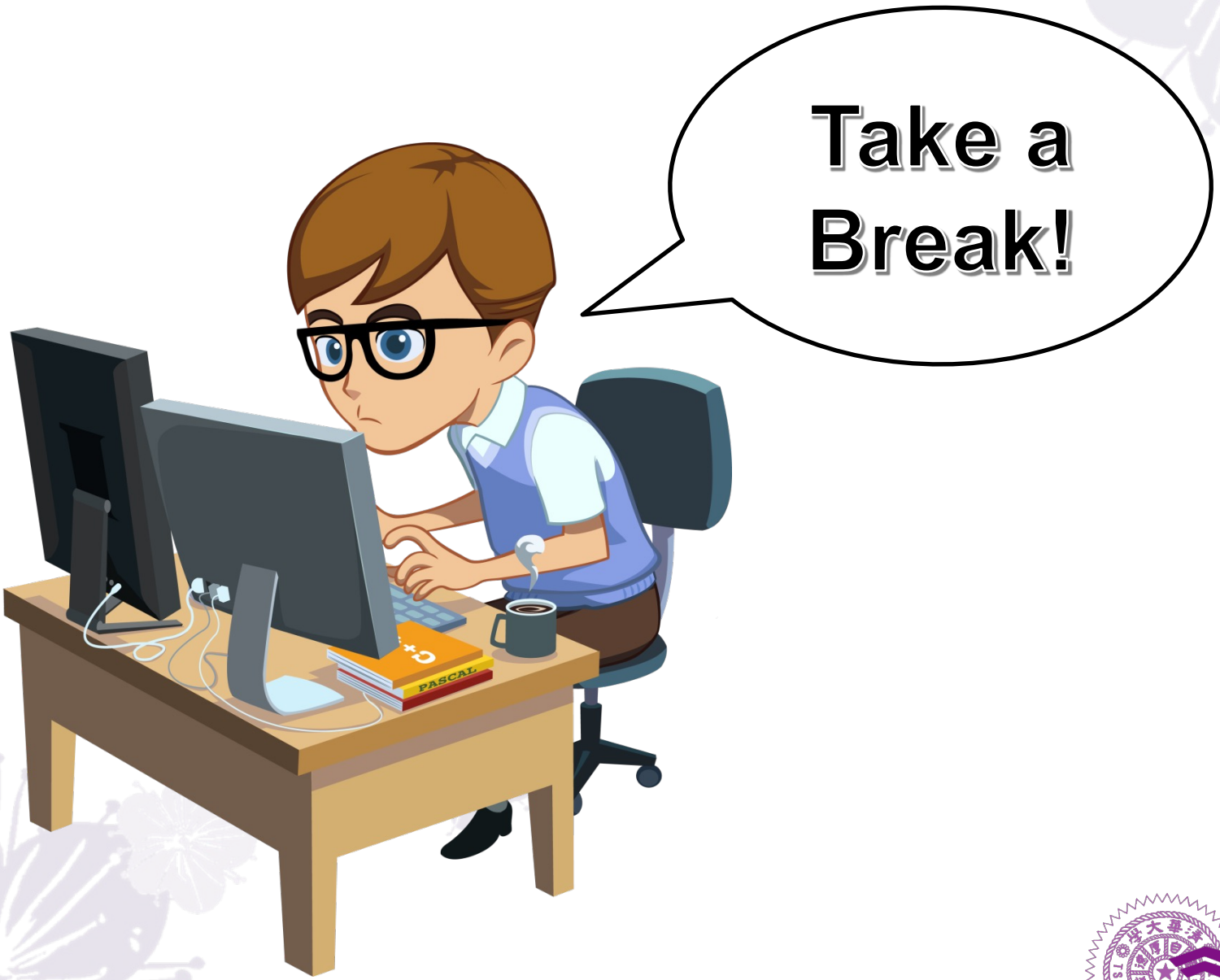
- **Reset** : reset all input to default value
- **Checkbox** : unlike radio buttons, checkboxes let the users select one or more options.
- **Button** : common buttons which are not used to submit form.
- **E-mail** : input box for e-mail only
- **Color** : color picker
- **Date** : date picker

W3School reference: HTML – Form Input Types

Input Attributes

- <input> element has many attributes. For example, '**value**' of text/radio.
- Common attributes:
  - 'readonly' : input can only be read
  - 'disable' : form will not be submitted if there is any illegal input
  - 'size' : determines the size of input text
  - 'maxlength' : limits the length of input

W3School reference: HTML – Form Input Attributes


Take a
Break!
C++
PASCAL

HTML Multimedia

- Multimedia in HTML include:
  - Audios : .mp3, .mp4, .WAV, etc.
  - Videos : .FLV, AVI, .mp4, etc.
  - Movies
  - Animations

Audio

- HTML5 **<audio></audio>** embeds audio in a web page.
- There are 2 ways to specifies the source of an audio.
  - 'src' specifies the source address. 'type' determines the media type

```
<audio src="audio.mp3"></audio>
```

```
<audio>
   <source src="audio.mp3" type="audio/mpeg">
</audio>
```

Audio (Cont'd)

- <audio> common attributes:
  - 'autoplay' : if played automatically
  - 'controls' : shows a control bar 
  - loop : loop the music or not
  - muted : if it is initially muted.

```
<audio autoplay controls loop muted>
    <source src="audio.mp3" type="audio/mpeg">
</audio>
```

W3School reference: HTML5 – Audio

Video

- **<video></video>** is similar to audio.
- It is recommended to always add 'controls'
  - Unlike <audio>, we can control the video size with 'width' and 'height' attributes

```
<video width="360" height="240" controls>
   <source src="video.mp4" type="video/mp4">
</video>
```

W3School reference: HTML5 – Video

YouTube Videos

- Videos often cause format problems, so it is a better way to embed a YouTube video in a web page.
- **<iframe></iframe>** is a special element which shows the content of another web page on the current one.
- Use <iframe> to embed YouTube videos in a web page.

YouTube Videos (Cont'd)

YouTube id

https://www.youtube.com/watch?v=R3ooYSaQF8Q

```
<h1>My YouTube Video</h1>
<br>
<iframe width="480" height="360"
    src="https://www.youtube.com/embed/R3ooYSaQF8Q">
</iframe>
```

My YouTube Video

HTML Graphics

- Use **<canvas></canvas>** to render graphics on the specified area of a web page.
- **Draw on a canvas with JavaScript!**
  - Get the canvas element with DOM and draw with JavaScript.
- **Tools like WebGL provides API to let users render 2D or 3D content on a HTML canvas.**

Canvas

- Use <canvas> to define a rectangle area where we draw.
- A default canvas has no border and no content.

```
<canvas id="myCanvas"
    width="600" height="400"
    style="border:1px solid #000000;">
</canvas>
```

W3School reference: HTML5 – Canvas

Canvas Example (網頁小畫家)

Take Home!

- **Introduction**
  - Editing, Comment, Tags and Elements
- **Page structure**
  - <html>, <head>, <body>
- **Difference between Block element & Inline element**
- **Basic content display**
  - <p>, <h1>~<h6>, <image>, etc.
  - List and Table
- **Form**
  - HTTP, Form processing, Input
- **Multimedia**
  - Audio, Video, YouTube
- **Graphics**
  - Canvas


thank you!
Question?