Design Document

COMP1021 Introduction to Web Technologies

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Table of contents

Design of intended features

CSS

- Bootstrap has been fully integrated into the website.

JavaScript

- Realized the effect of making the pictures play in turn.

- The interactive effect of animation is realized when the mouse is hovering over the picture.

Advanced features of HTML5

- The website concludes an advanced feature of HTML5 – SVG

```
<div id="prev" class="prev"><svg t="1590475338509" class="icon" viewBox="0 0 1024 1024" version="1.1
" xmlns="http://www.w3.org/2000/svg" p-id="2799" width="40" height="40"><path d="M254.89
512l448-448 60.417 60.33-448 448L254.89 512z m60.843-60.757l453.291 453.376-60.33
60.33-453.377-453.376 60.416-60.33z" p-id="2800" fill="#e6e6e6"></path></svg></div>
<div id="next" class="next"><svg t="1590475430357" class="icon" viewBox="0 0 1024 1024" version="1.1
" xmlns="http://www.w3.org/2000/svg" p-id="3162" width="40" height="40"><path d="M769.11 512l-448
448-60.417-60.33 448-448L769.11 512z m-60.843 60.757l-453.291-453.376 60.33-60.33 453.377
453.376-60.416 60.33z" p-id="3163" fill="#e6e6e6"></path></svg></div>
```

- Integration of an external web service.

  When clicking on these two images, the page will go to the corresponding website and enjoy the services and applications contained in the website.

Evaluation of implementation

Design

Justification for any design decisions made:

- Through the picture and the text lets the visitor understand this website introduction and the content which contains.

- Divide the site into sections. The homepage introduces the main content of the website. Visitors can navigate to other pages within the site through the navigation bar at the top of the site.

A new set of features and their benefits:

- The image rotation effect allows viewers to view images and content without having to click a mouse.

- The interactive effect of hovering the mouse over the picture with animation makes the website more interactive and dynamic.
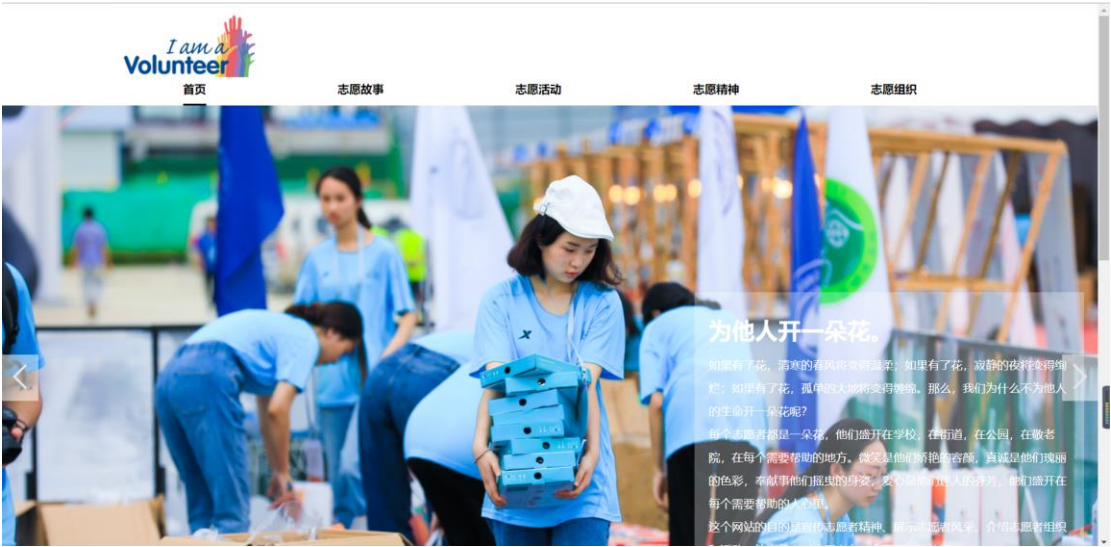
Evaluation

An evaluation and consideration of the impact on site of the new features.

A method testing approach: Web pages can run normally in different window sizes.

Compared to similar types of sites: http://www.zgzyz.org.cn/ (China Youth

Volunteer Network) https://www.unv.org/ (International Network of Volunteer

organizations). The improvement of website in the future:

- Provide richer and more detailed content

- Incorporate more volunteer-related content and services than mere
  introductions.

- Add more external Web services that benefit the user experience.

The role of a client and server in the world wide web

There are hundreds of ways to configure a web application. That said, most of

them follow the same basic structure: a client, a server, and a database.
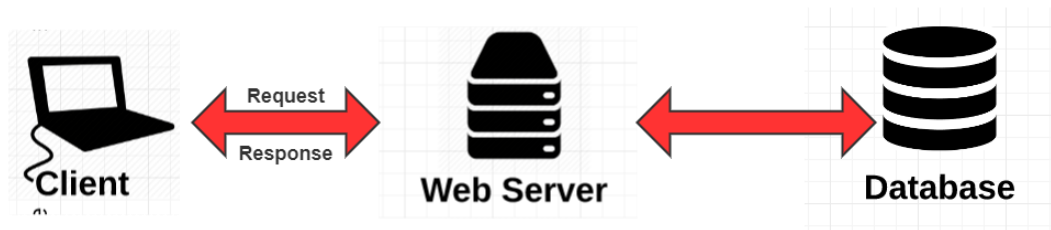
The client

An application, such as Chrome or Firefox, that runs on a computer and is

connected to the internet. Its primary role is to take user interactions and

translate them into requests to another computer called a web server. Although

we typically use a browser to access the web, it could be considered whole

computer as the "Client" piece of the client-server model. Every client computer

has a unique address called an IP address that other computers can use to

identify it.

Figure 1. Server side flow.

The client is what the user interacts with. So "client-side" code is responsible for most of what a user actually sees. This includes:

1. Defining the ***structure*** of the web page

2. Setting the ***appearance*** of the web page

3. Implementing a mechanism for responding to ***user interactions***

Structure: The layout and content of the webpage are defined by HTML which stands for Hyper Text Markup Language. It allows user to describe the basic physical structure of a document using HTML tags. Each HTML tag describes a specific element on the document. For example:

```html
<!DOCTYPE html>
<html>
  <meta charset="utf-8" />
    <title>SUPER BASIC</title>
  <head>
    <script src="lib/lodash.js"></script>
  </head>
  <body>
    <header>
      Hello Friends!
    </header>
    <h1>My super duper fun heading</h1>
    <div id="mywebsite">
      <p>
        Welcome to my super basic website
      </p>
      <ul id="hello">
        <li>Hello 1</li>
        <li>Hello 2</li>
        <li>Hello 3</li>
      </ul>
      <button id="button">Get me another Hello!</button>
    </div>
    <script src="myAwesomeJavaScript.js"></script>
  </body>
</html>
```

- The content within the "<h1>" tag describes the heading.

- The content within the "<p>" tag describes a paragraph.

- The content within the "<button>" tag describes a button.

- And so on…

A web browser uses these HTML tags to determine how to display the document.

Appearance: To define the appearance of a webpage, web developers use CSS, which stands for Cascading Style Sheets. CSS is a language that that lets users describe how the elements defined in your HTML should be styled, allowing changes in font, color, layout, simple animations, and other superficial elements. User could set styles for the above HTML page like this:

```css
1    body {
2      font-family: 'sans-serif';
3      font-color: 'black';
4      font-size: 14;
5    }
6
7    h1 {
8      font-color: 'red';
9      font-size: 20;
10   }
11
12   #hello {
13     font-style: italic;
14   }
15
```

User interactions: Lastly, JavaScript comes into the picture to handle user interactions. For example, if users want to do something when a user clicks your button, you might do something like this:

```
1    var button = document.getElementById('button');
2    button.addEventListener('click', function() {
3      alert('You clicked me!');
4    });
5
```

Some user interactions, like the one above, can be handled without ever having to reach out to your server — hence the term "client-side JavaScript." Other interactions require that users send the requests to the server to handle.

The server

A machine that is connected to the internet and also has an IP address. A server waits for requests from other machines such as a client and responds to them. Unlike the computer which also has an IP address, the server has special server software installed and running which tells it how to respond to incoming requests from your browser. The primary function of a web server is to store, process and deliver web pages to clients. There are many types of servers, including web servers, database servers, file servers, application servers, and so on. The server in a web application is what listens to requests coming in from the client. When you set up an HTTP server, you set it up to listen to a port number. A port number is always associated with the IP address of a computer.

Once users have set up an HTTP server to listen to a specific port, the server waits for client requests coming to that specific port, performs any actions stated by the request, and sends any requested data via an HTTP response.
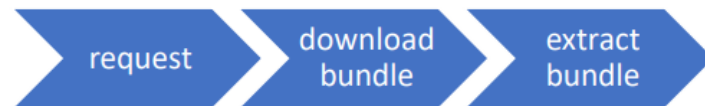

Figure 2. Client side flow.

The database

Databases are the basements of web architecture which are critical to a solid foundation. A database is a place to store information so that it can easily be accessed, managed, and updated. When a visitor requests a page, the data inserted into the page comes from the site's database, allowing for the real-time user interactions we take for granted on sites like Facebook or apps like Gmail.

The Client-Server Model

This idea of a client and server communicating over a network is called the "Client-Server" model. It's what makes viewing websites and interacting with web applications. The Client-Server model is really just a way to describe the give-and-take relationship between the client and server in a web application. It's the details of how information passes from one end to the other where the picture gets complicated.

HTTP protocol

HTTP is a standard for both client-side and server-side requests and responses. All Web-based applications use the HTTP protocol. By using a Web browser, Web crawler, or other tool, the client initiates an HTTP request to the specified port on the server. Although THE TCP/IP protocol is the most popular application on the Internet, the HTTP protocol does not stipulate that it and (based on) the layers it supports must be used.I n fact, HTTP can be implemented over any other Internet protocol, or over any other network. HTTP assumes only reliable transport, and any protocol that provides this assurance can be used.

Concept of HTTP protocol

The hypertext Transfer Protocol (HTTP) is a communications protocol that allows hypertext markup (HTML) documents to be sent from a Web server to a client's browser. HTTP is an application layer object-oriented protocol, because of its simple, fast way, suitable for distributed hypermedia information system. After several years of use and development, has been constantly improved and expanded. Currently in use in the WWW is version 6 of HTTP/1.0.

Characteristics

1. Support "client-server" mode.

2. Simple and fast: when the client requests service to the server, it only needs

to send the request method and path. Common request methods are GET, HEAD, and POST. Each method specifies a different type of contact between the client and the server. Due to the simple HTTP protocol, the PROGRAM size of THE HTTP server is small, so the communication speed is very fast.

3. Flexible: HTTP allows the transfer of any type of data. The Type in transit is marked by content-Type.

4. Connectionless: Connectionless means limiting the processing of only one request at a time. After the server has processed the customer's request and received the customer's reply, it disconnects. In this way, transmission time can be saved.

5. Stateless: HTTP protocol is a stateless protocol. Stateless means that the protocol has no memory for transactions. The lack of state means that if subsequent processing requires the previous information, it must be retransmitted, which can lead to an increase in the amount of data transferred per connection. It does not know that the two requests are from the same client. To solve this problem, Web applications introduce a Cookie mechanism to maintain state. On the other hand, the server answers faster when it does not need previous information.

The operation of the HTTP protocol when the server requests a Web page

The process of a Web request (HTTP protocol workflow)
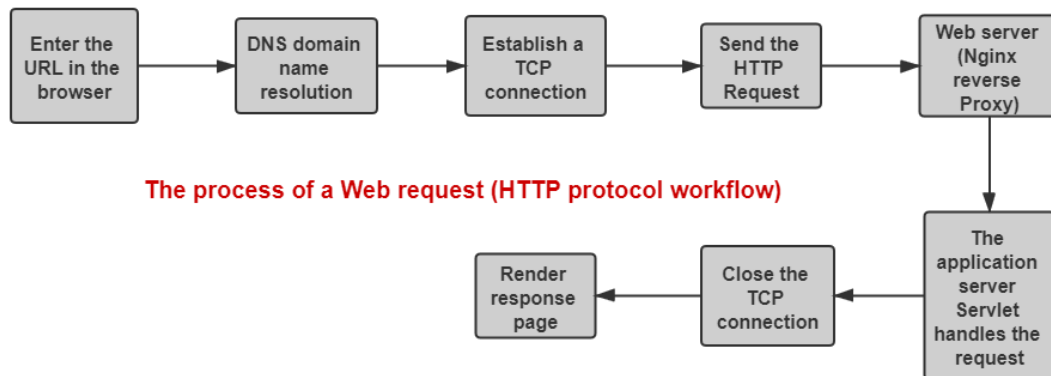
1. The browser uses DNS to resolve the domain name to the corresponding IP address

2. According to this IP address on the Internet to find the corresponding server, establish a Socket connection

3. The client server sends HTTP protocol requests for document resources in the server

4. On the server side, there is actually complex business logic: there may be multiple servers pointing to which server to process the requests, which requires a load balancing device to evenly distribute all users' requests

5. Whether the requested data is stored in a distributed cache or a static file, or in a database;

6. When the data is returned to the browser, the browser parses the data and finds that there are some static resources such as CSS, JS, or images and makes another request, which may be on the CDN, then the CDN server

will process the user's request.

7. Client is disconnected from server. The client interprets the HTML document and renders the graphic results on the client screen.

Request

The Request message is divided into three parts. The first part is called the Request line, the second part is called the HTTP header, and the third part is the body. There is an empty line between the header and the body. The Method in the first line represents the request Method, as compared to the "POST", "GET", path-to-resource table shows the requested source, and Http/version number represents the version number of the Http protocol. When the "GET" method is used, the body is empty. The Http protocol defines many ways to interact with the server. There are four basic methods, namely GET, POST, PUT, and DELETE.GET, POST, PUT, and DELETE in HTTP correspond to the four operations of checking, modifying, adding, and deleting the resource. The most common ones we see are GET and POST.GET is typically used to GET/query resource information, while POST is typically used to update resource information.

Response

Similar to the structure of the Request message, the structure of the Response message is also divided into three parts. The first part is called Request line,

the second part is called Request Header, and the third part is the body. There is also an empty line between the header and the body. The HTTP/version-number table shows the version number of the HTTP protocol, and the status-code and message are the status codes. The first line in the Response message is called the status line and consists of the HTTP protocol version number, status code, and status message. The status code is used to tell the HTTP client whether the HTTP server is producing the expected Response. Five types of status codes are defined in HTTP/1.1. The status codes are composed of three digits, the first digit defining the category of the response.

_200 OK-_ The most common is the successful response status code of 200, which indicates that the request was successfully completed and the requested resource was sent back to the client.

302 Found redirection, the new URL will be returned in Location in Response, and the browser will issue a new Request using the new URL.

304 Not Modified means that the last document has been cached and can be used again.

400 Bad Request client Request and syntax error, cannot be understood by the server.

403 Forbidden servers received the request, but refused to serve it.

404 Not Found The requested resource does Not exist.

500 Internal Server Error an Unexpected Error occurred on the Server.

503 Server Unavailable Server is currently unable to process the client request

and may be back to normal after a period of time.

Comparison of the purposes of HTML and CSS

CSS

Cascading Style Sheets, fondly referred to as CSS, is a simple design language

intended to simplify the process of making web pages presentable. There are

some key advantages of learning CSS:

- *Create Stunning Web site* - CSS handles the appearance part of a web page. Using CSS, engineers can control the color of the text, the style of fonts, the spacing between paragraphs, how columns are sized and laid out, what background images or colors are used, layout designs, variations in display for different devices and screen sizes as well as a variety of other effects.

- *Control web* - CSS provides powerful control over the presentation of an HTML document. Most commonly, CSS is combined with the markup languages HTML or XHTML.

- *Learn other languages* - Once understand the basic of HTML and CSS then other related technologies like JavaScript, php, or angular are become easier to understand.

Additionally, CSS is one of the most widely used style language over the web.

Some of its features are listed below:

- *CSS saves time* - Engineers can write CSS once and then reuse same sheet in multiple HTML pages. Users can define a style for each HTML element and apply it to as many Web pages as users want.

- *Pages load faster* - If using CSS, users do not need to write HTML tag attributes every time. Just write one CSS rule of a tag and apply it to all the occurrences of that tag. So, less code means faster download times.

- *Easy maintenance* - To make a global change, simply change the style, and all elements in all the web pages will be updated automatically.

- *Superior styles to HTML* - CSS has a much wider array of attributes than HTML, so users can give a far better look to your HTML page in comparison to HTML attributes.

- *Multiple Device Compatibility* - Style sheets allow content to be optimized for more than one type of device. By using the same HTML document, different versions of a website can be presented for handheld devices such as PDAs and cell phones or for printing.
- *Global web standards* - Now HTML attributes are being deprecated and it is being recommended to use CSS. So, it's a good idea to start using CSS in all the HTML pages to make them compatible to future browsers.

HTML

HTML, which is short for Hypertext Markup Language, is the code that is used to structure a web page and its content. For example, content could be structured within a set of paragraphs, a list of bulleted points, or using images and data tables. HTML is not a programming language; it is a markup language that defines the structure of your content. HTML consists of a series of elements, which users use to enclose, or wrap, different parts of the content to make it appear a certain way, or act a certain way. The enclosing tags can make a word or image hyperlink to somewhere else, can italicize words, can make the font bigger or smaller, and so on.

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