2023-24 COMP3322A

Assignment Two

My Weather Portal

Overview

- A Weather App for displaying
  - Current weather condition of Hong Kong
  - Temp, Rainfall, Air Quality condition of your location
  - Temp, Rainfall, Air Quality of various districts/locations
  - 9-day weather forecast of Hong Kong

Objectives

- To learn how to make use of Open Data.
- To consolidate your JavaScript coding skill
  - build a Web page from scratch,
  - carry out AJAX communication for retrieving Data
  - create dynamic contents
- To practice using CSS styling to design responsive Web application.
- A learning activity to support ILO 1 and ILO 2.

Open Data

- **HKO Current Weather Report**
  1) Rainfall data - 18 districts
  2) Temperature data - 26 weather stations (was 27 stations)
  3) Humidity data
  4) UV level
  5) Warning message(s)
  6) Current weather icon
  7) Others

- **HKO 9-day Weather Forecast**
  - 9 days prediction
  - 1) Weather icon
  - 2) PSR – prob of rain
  - 3) Temperature range
  - 4) Humidity range

Open Data

- **OGCIO Air Quality Health Index**
  - 18 AQ monitoring stations
  - 1) Air Quality Health Index
  - 2) Health risk level

- **HTML5 Geolocation API**

- **Nomination search engine for OpenStreetMap** - Reverse Geocoding API
  - Giving the longitude and latitude to find the physical addressing information

Other Data (Static)

- **OGCIO Weather Station Information**
  - 27 weather stations
    - longitude & latitude
- **Air Quality Monitoring Station Information**
  - 18 monitoring stations
    - longitude & latitude

Create a folder called 'data' under your site; place the two files in this folder

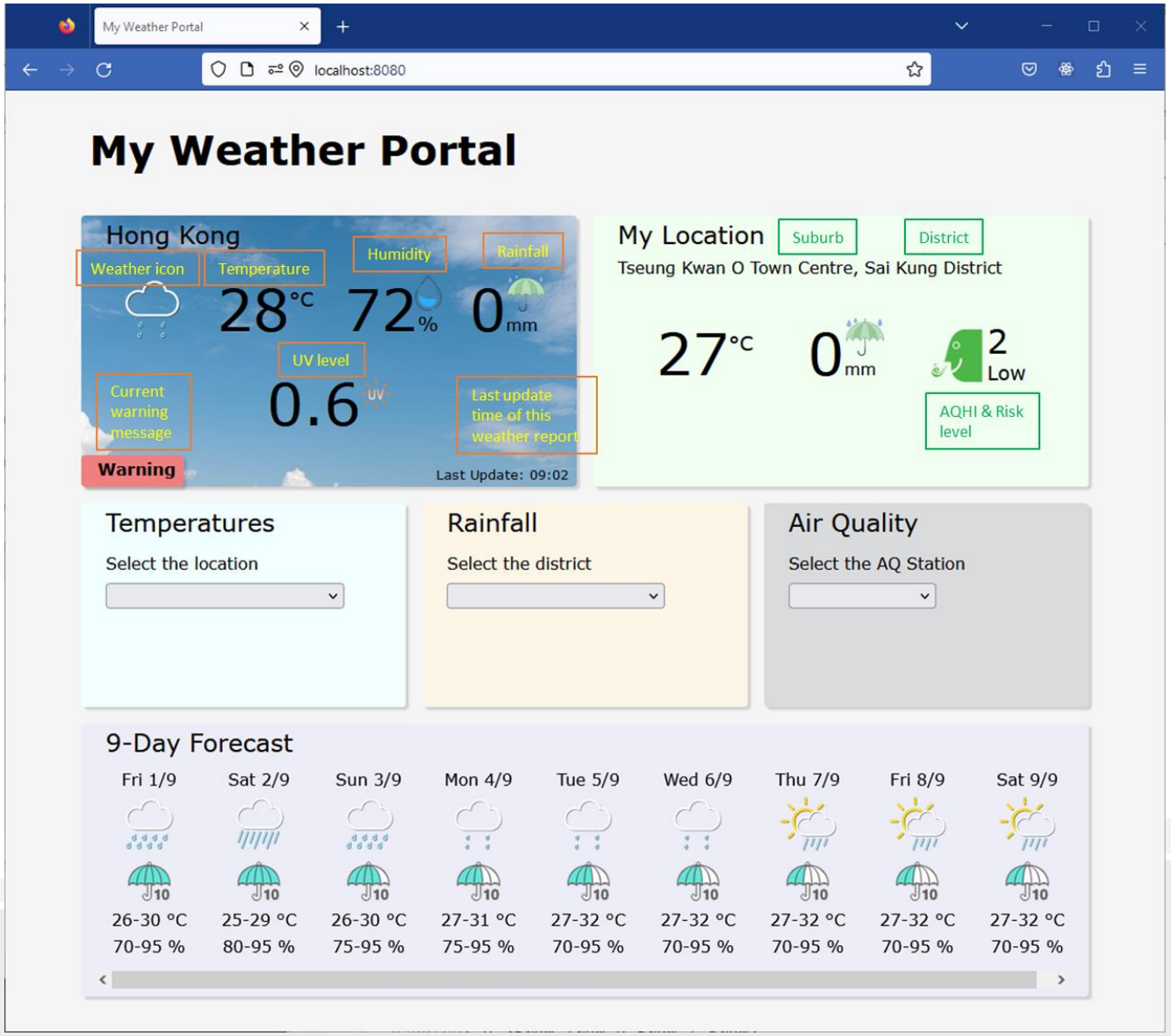
Current weather report Temperatures

place	value
Chek Lap Kok	26
Cheung Chau	25
Happy Valley	27
Hong Kong Observatory	26
Hong Kong Park	25
Kai Tak Runway Park	27
King's Park	26
Kowloon City	25
Kwun Tong	25
Lau Fau Shan	25
Sai Kung	25
Sha Tin	26
Sham Shui Po	25
Shau Kei Wan	25
Stanley	27
Ta Kwu Ling	25
Tai Mei Tuk	25
Tai Po	26
Tseung Kwan O	25
Tsing Yi	26
Tsuen Wan Ho Koon	24
Tsuen Wan Shing Mun Valley	25
Tuen Mun	25
Wong Chuk Hang	26
Wong Tai Sin	26
Yuen Long Park	25

Weather Station JSON

station_code	station_name_en
CLK	Chek Lap Kok
CCH	Cheung Chau
HPV	Happy Valley
HKO	Hong Kong Observatory
HKP	Hong Kong Park
SE1	Kai Tak Runway Park
KP	King's Park
KLT	Kowloon City
KTG	Kwun Tong
LFS	Lau Fau Shan
SKG	Sai Kung
SHA	Sha Tin
SSP	Sham Shui Po
SKW	Shau Kei Wan
SEK	Shek Kong
STY	Stanley
TKL	Ta Kwu Ling
PLC	Tai Mei Tuk
TPO	Tai Po
JKB	Tseung Kwan O
TY1	Tsing Yi
TWN	Tsuen Wan
TW	Tsuen Wan Shing Mun Valley
TU1	Tuen Mun
HKS	Wong Chuk Hang
WTS	Wong Tai Sin
YLP	Yuen Long Park

Recommended Implementation



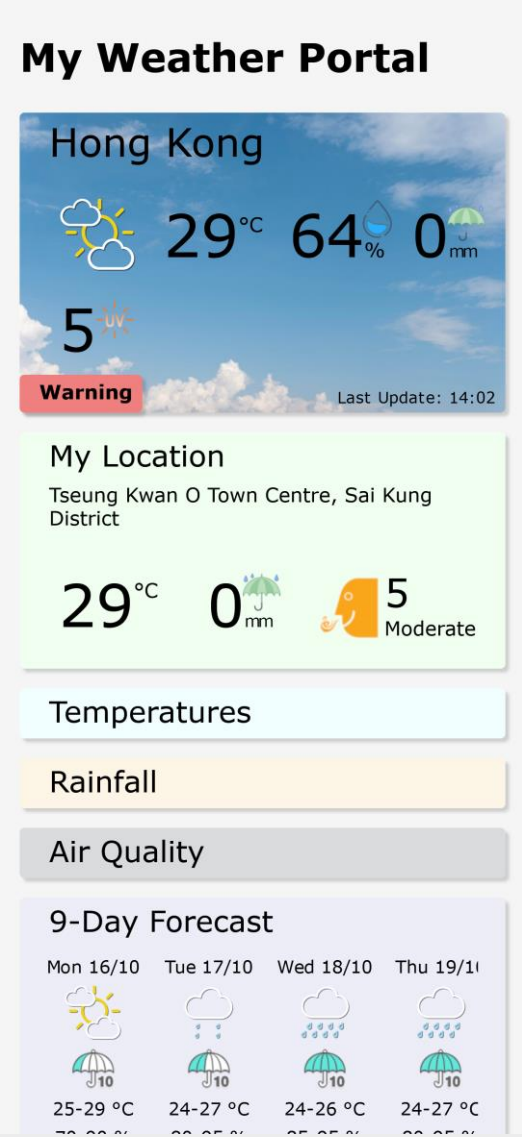
Title

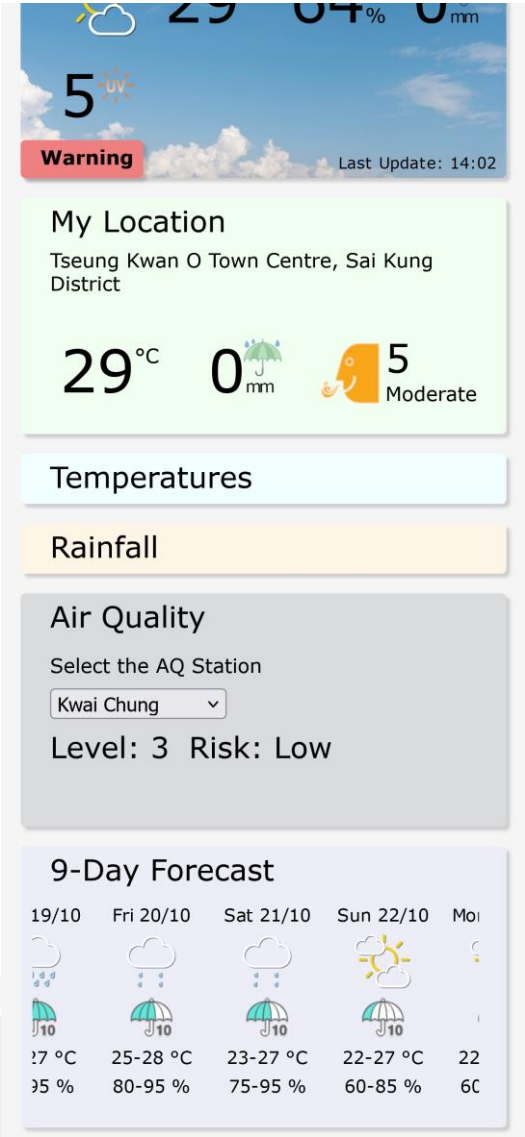
Header block

MyData block

9-day Weather Forecast block

Recommended Implementation





Header Block

- Data from HKO Current Weather Report
  - Weather icon
  - Temperature value of HKO
  - Humidity value of HKO
  - Rainfall value of Yau Tsim Mong district
  - UVindex level of King's Park (if present)
  - Warning message(s) (if present)
  - Last update time of the report

Header Block

During daytime without raining

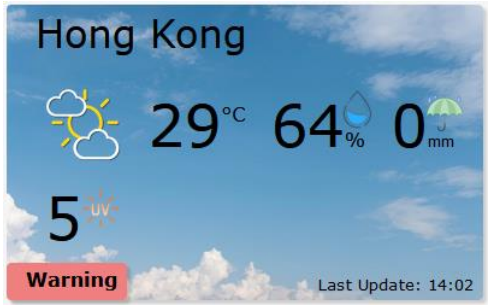
During daytime with rain

During night-time without raining

During night-time with rain

Header Block

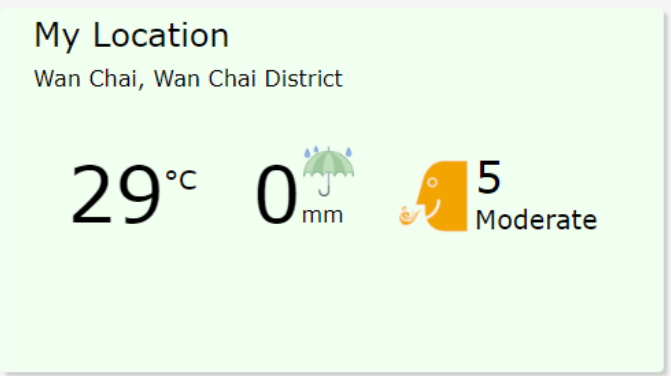
- Warning message(s)
  1) May have more than one warning messages
  2) If present of the warning message(s), display a 'button' on the bottom left corner, which allows user to **toggle** between showing or hiding the warning message(s).

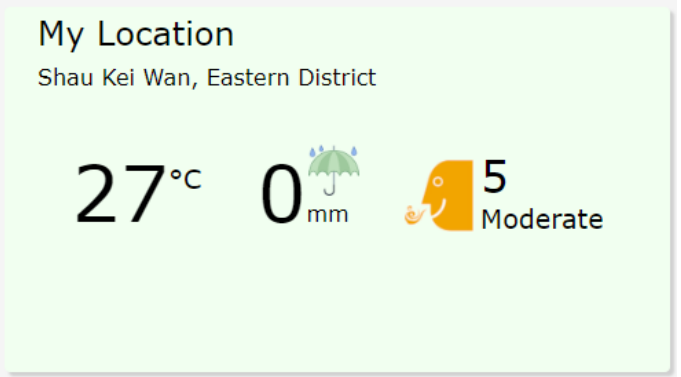


MyData Block

- Shows
  - Your location information
    - Suburb and District
  - Rainfall of your current district
  - Temp data of a nearby weather station
  - AQ data of a nearby AQ monitoring station

Location: Happy Valley
WS: Happy Valley
AQS: Causeway Bay





Location: Heng Fa Chuen
WS: Shau Kei Wan
AQS: Eastern

https://i.cs.hku.hk/~atctam/c3322/HTML5/getlocation.html

Finding Your Location

- Use HTML5 Geolocation API to get the geographical position (**latitude and longitude** coordinates) of your device
- Use Reverse Geocoding API to obtain the address information (**District and Suburb**)
  - Not all returned address information has the suburb field or city_district field

if has suburb field
  return suburb
else if has borough field
  return borough as suburb
else if has town field
  return town as suburb
else
  return 'Unknown'
	if has city_district field
	  return city_district as district
	else
	  search for any field that has the value contains 'District'
	  if found
	  return the value of that field as district
	  else
	  return 'Unknown'

Find Nearby Weather Station and AQ Monitoring Station

- Base on the 'Equirectangular approximation' formula to calculate the approximate distance between your current position with a weather/air quality station

```
const x = (λ2-λ1) * Math.cos((ϕ1+ϕ2)/2);
const y = (ϕ2-ϕ1);
const d = Math.sqrt(x*x + y*y) * R;
```

where ϕ is latitude, λ is longitude, R is earth's radius (mean radius = 6,371km); we must convert the latitude and longitude coordinates to radians before passing them to the cosine function. For example,

```
ϕ = latitude * Math.PI/180;
λ = longitude * Math.PI/180;
```

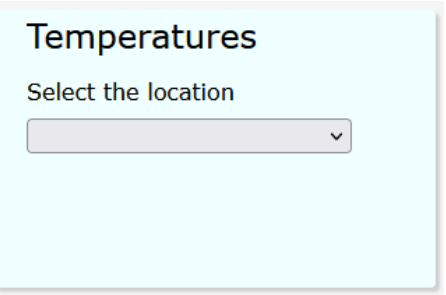
- Compare the long/lat of current location to
  - Each station (**except Shek Kong**) in the Weather Station Info set and
  - Each station in the Air Quality Monitoring Station info set

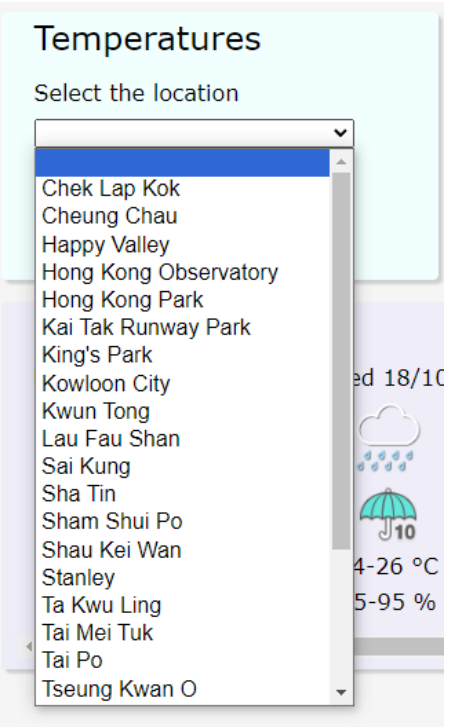
Present Temp Data and AQ Data

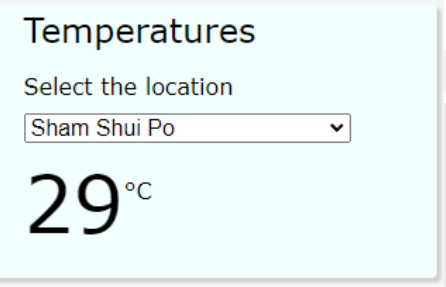
- Once locate nearby Weather Station, find the corresponding temperature data in the HKO Current Weather Report
- Once locate nearby AQ Monitoring Station, find the corresponding AQ data in the OGCIO Air Quality Health Index

Temperature Block

- Data from HKO Current Weather Report
  - Temperature data of weather stations
  - # At most 26 weather stations, may have less during the day
  - # Allows the user to select a target location
  - **Listed in alphabetical order**





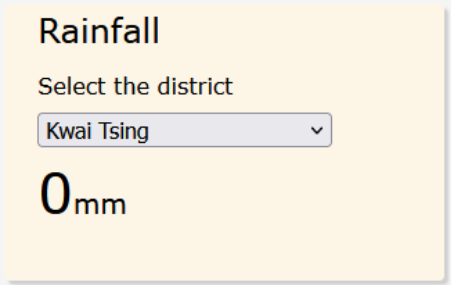


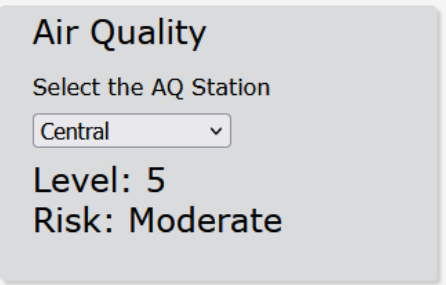
Rainfall and Air Quality Blocks

Rainfall

- Data from HKO Current Weather Report
  - Rainfall data of 18 districts
  - **Listed in alphabetical order**

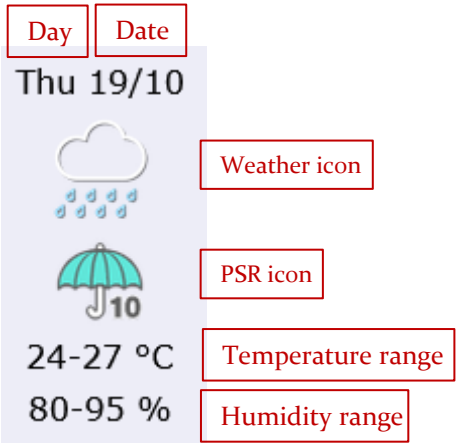
- Data from the AQHI individual station dataset
  - Air quality value and level of 18 stations
  - **Listed in alphabetical order**

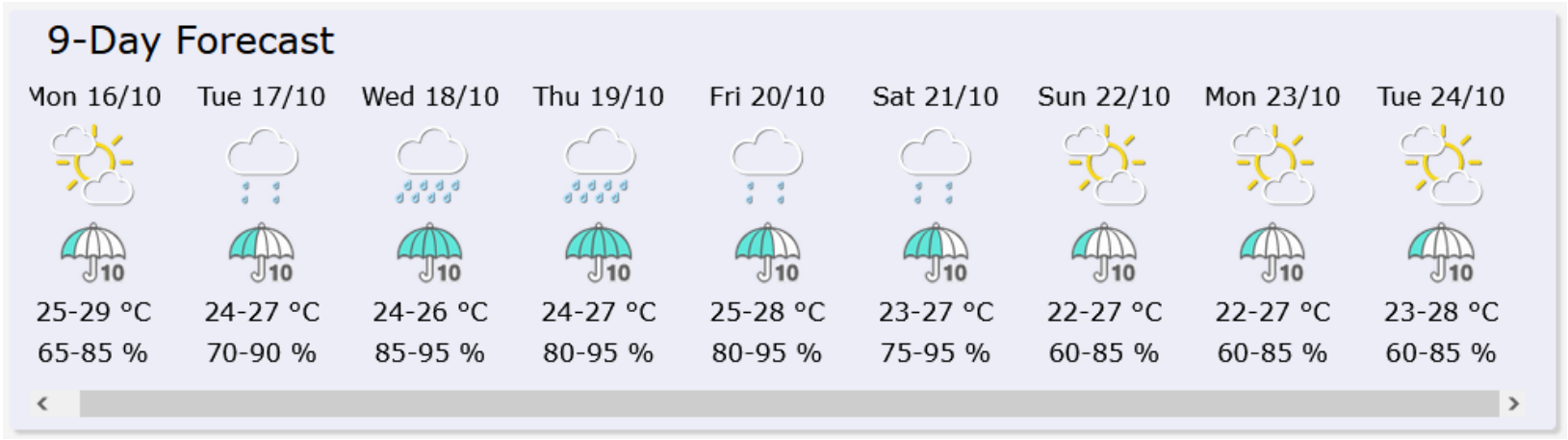


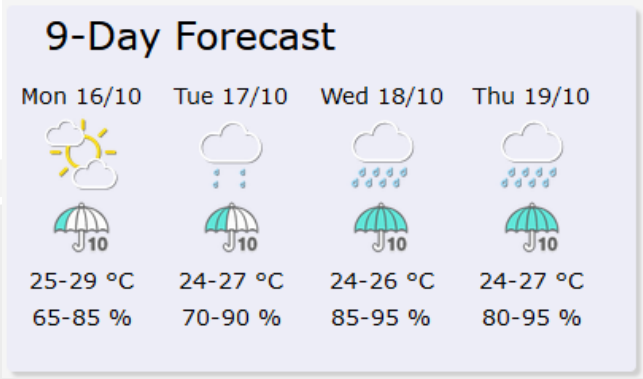


Forecast Block

- Data from HKO 9-day Weather Forecast Report
  - Shows all 9 days' forecast data







Using index.html as the Web app main page

```
<!doctype html>
<html>
<head>
  <meta charset="utf-8">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <link rel="stylesheet" href="style.css">
  <script src="main.js"></script>
  <title>My Weather Portal</title>
</head>
<body>
<!--
Use JavaScript to add all HTML elements
-->
</body>
</html>
```

Resources

- images.zip - this file contains all images used in the recommended implementation
  - Unzip it to your site and all images will be under the ‘images’ folder
- data.zip - sample AQHI data, and 9-day forecast and weather data
- index.html - this is the base document of your Web app.

data.zip

- This file contains samples
  - AQHI data from OGCIO
  - 9-day forecast and weather data from HKO
- They serve two purposes
    - The weather data set contains records with the warning message, raining day, & UV index
    - Test the Web app without getting the data from HKO and OGCIO
  - Please make sure that your Web app is using real-time data from HKO and AQHI APIs when you submit your program

Requirements

- Retrieve all Open Data datasets using XHR object or fetch()
  1) Use real-time data from HKO and AQHI APIs
  2) **For OGCIO weather station info and AQ monitoring station info, place them in a data/ folder in your Website** (Forgot to mention this in the document)
- Not allowed to use external libraries (e.g., Bootstrap, jQuery) for the task
- Use index.html as the Web app main page
  - **Your task is to implement the two files - style.css and main.js**
- Use JavaScript to build the body part of the whole web page

Implementation Tips

- Build the Header Block first, then the Temp&Rainfall&AQ Blocks, then 9-day Forecast Block, and finally the MyData Block
- To test the layout and look of your website using those sample datasets
  - Rainy day, UVindex, Warning message, Forecast, AQHI
- As a new Web developer
  - Hardcode HTML elements in the <body> first and replace them later by using appropriate JavaScript statements,
  - e.g., createElement('span'),"....." OR
  - e.g., xxxx.innerHTML = ".....
  - Embed your JavaScript code in index.html first and later move them to the external file main.js

Have Fun!!