



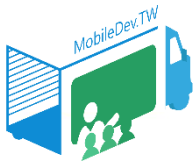
# 資料視覺化 - 使用D3.js

Ryan Chung



# 課程大綱

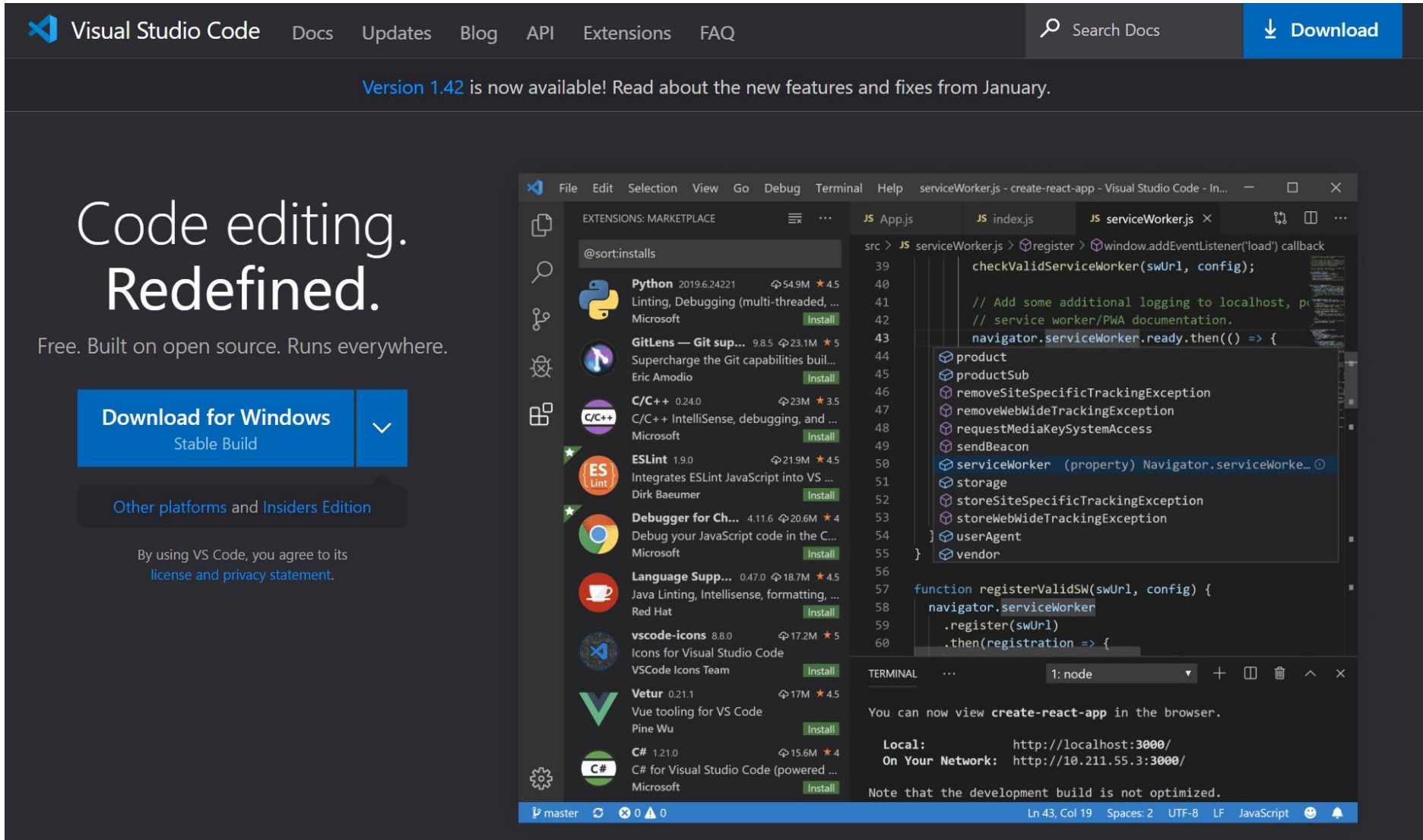
- 開發環境安裝
- 使用SVG繪圖
- 資料取得
  - 本地/多檔/遠端
- 長條圖
- 散佈圖
- 折線圖
- 資料更新與呈現
  - 水果清單更新
  - 長條圖切換
- 使用者互動
  - 長條圖個別細節查看
  - 散佈圖局部觀察



# D3

- Data-driven Document
- 史丹佛大學(2011年)
- 將資料透過DOM(Document Object Model)來呈現
- 使用技術
  - HTML
  - CSS
  - JavaScript
  - SVG

# 開發環境



The image shows the Visual Studio Code website on the left and a screenshot of the Visual Studio Code application on the right.

**Visual Studio Code Website:**

- Navigation: Visual Studio Code, Docs, Updates, Blog, API, Extensions, FAQ
- Search: Search Docs
- Download: Download
- Version 1.42 is now available! Read about the new features and fixes from January.
- Code editing. Redefined.
- Free. Built on open source. Runs everywhere.
- Download for Windows (Stable Build)
- Other platforms and Insiders Edition
- By using VS Code, you agree to its [license and privacy statement](#).

**Visual Studio Code Application Screenshot:**

- File Explorer: Extensions: Marketplace
- Search: @sort:installs
- Extensions List:
  - Python 2019.6.24221 54.9M ★ 4.5
  - GitLens — Git sup... 9.8.5 23.1M ★ 5
  - C/C++ 0.24.0 23M ★ 3.5
  - ESLint 1.9.0 21.9M ★ 4.5
  - Debugger for Ch... 4.11.6 20.6M ★ 4
  - Language Supp... 0.47.0 18.7M ★ 4.5
  - vscod... 8.8.0 17.2M ★ 5
  - Vetur 0.21.1 17M ★ 4.5
  - C# 1.21.0 15.6M ★ 4
- Code Editor:
 

```

src > JS serviceWorker.js > register > window.addEventListener('load') callback
39
40
41 checkValidServiceWorker(swUrl, config);
42
43 // Add some additional logging to localhost, p
44 // service worker/PWA documentation.
45 navigator.serviceWorker.ready.then(() => {
46
47   product
48   productSub
49   removeSiteSpecificTrackingException
50   removeWebWideTrackingException
51   requestMediaKeySystemAccess
52   sendBeacon
53   serviceWorker (property) Navigator.serviceWorke...
54   storage
55   storeSiteSpecificTrackingException
56   storeWebWideTrackingException
57   userAgent
58   vendor
59
60 function registerValidSW(swUrl, config) {
61   navigator.serviceWorker
62     .register(swUrl)
63     .then(registration => {

```
- Terminal:
 

```

1: node
You can now view create-react-app in the browser.
Local: http://localhost:3000/
On Your Network: http://10.211.55.3:3000/
Note that the development build is not optimized.
Ln 43, Col 19 Spaces: 2 UTF-8 LF JavaScript

```

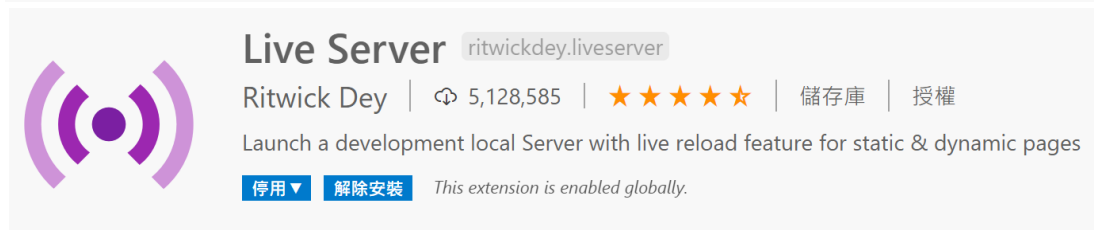
<https://code.visualstudio.com/>

# 安裝擴充套件

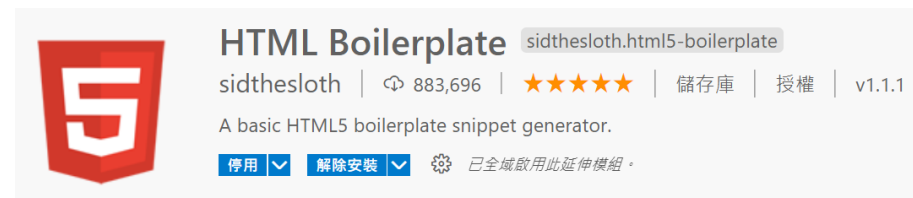
- 按下左邊 Extensions圖示或 Ctrl + Shift + X
  - Chinese (Traditional) Language Pack for Visual Studio Code
  - Live Server
  - HTML Boilerplate
- 設定Ctrl+滑鼠滾軸控制編輯器字型大小
  - editor.mouseWheelZoom
- 設定編輯時自動儲存
  - 檔案 -> 自動儲存



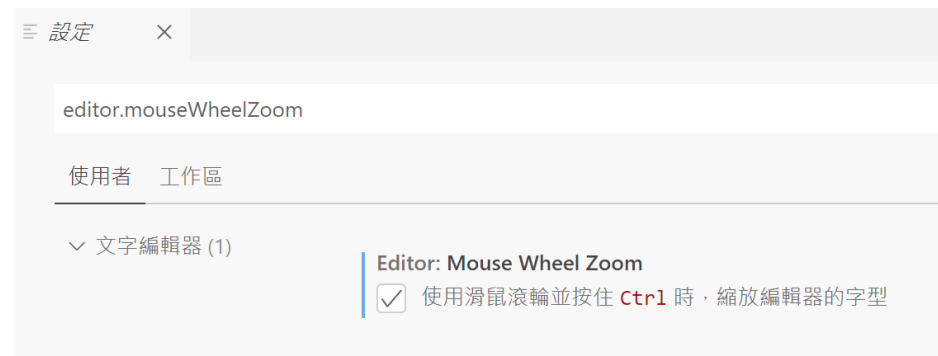
**Chinese (Traditional) Language Pack for Visual Studio Code** ms-ceintl.vscode-language-pack-zh-hant  
Microsoft | 359,224 | ★★★★★ | 儲存庫 | v1.52.2  
Language pack extension for Chinese (Traditional)  
解除安裝 | 已全域啟用此延伸模組。



**Live Server** ritwickdey.liveserver  
Ritwick Dey | 5,128,585 | ★★★★★ | 儲存庫 | 授權  
Launch a development local Server with live reload feature for static & dynamic pages  
停用 | 解除安裝 | This extension is enabled globally.



**HTML Boilerplate** sidthesloth.html5-boilerplate  
sidthesloth | 883,696 | ★★★★★ | 儲存庫 | 授權 | v1.1.1  
A basic HTML5 boilerplate snippet generator.  
停用 | 解除安裝 | 已全域啟用此延伸模組。



設定 ×

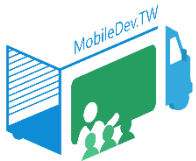
editor.mouseWheelZoom

使用者 工作區

▼ 文字編輯器 (1)

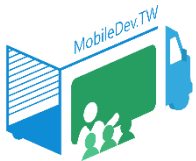
**Editor: Mouse Wheel Zoom**

☒ 使用滑鼠滾輪並按住 **Ctrl** 時，縮放編輯器的字型



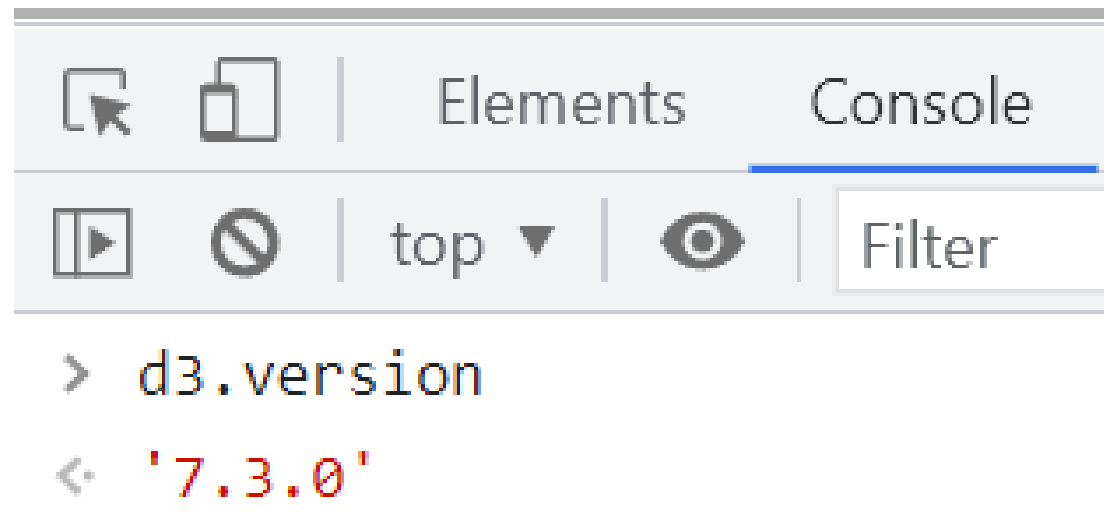
# index.html

```
<!DOCTYPE html>
<html>
  <head>
    <meta charset="utf-8">
    <title></title>
    <link rel="stylesheet" href="">
  </head>
  <body>
    <script src="//unpkg.com/d3"></script>
    <script>debugger;</script>
  </body>
</html>
```



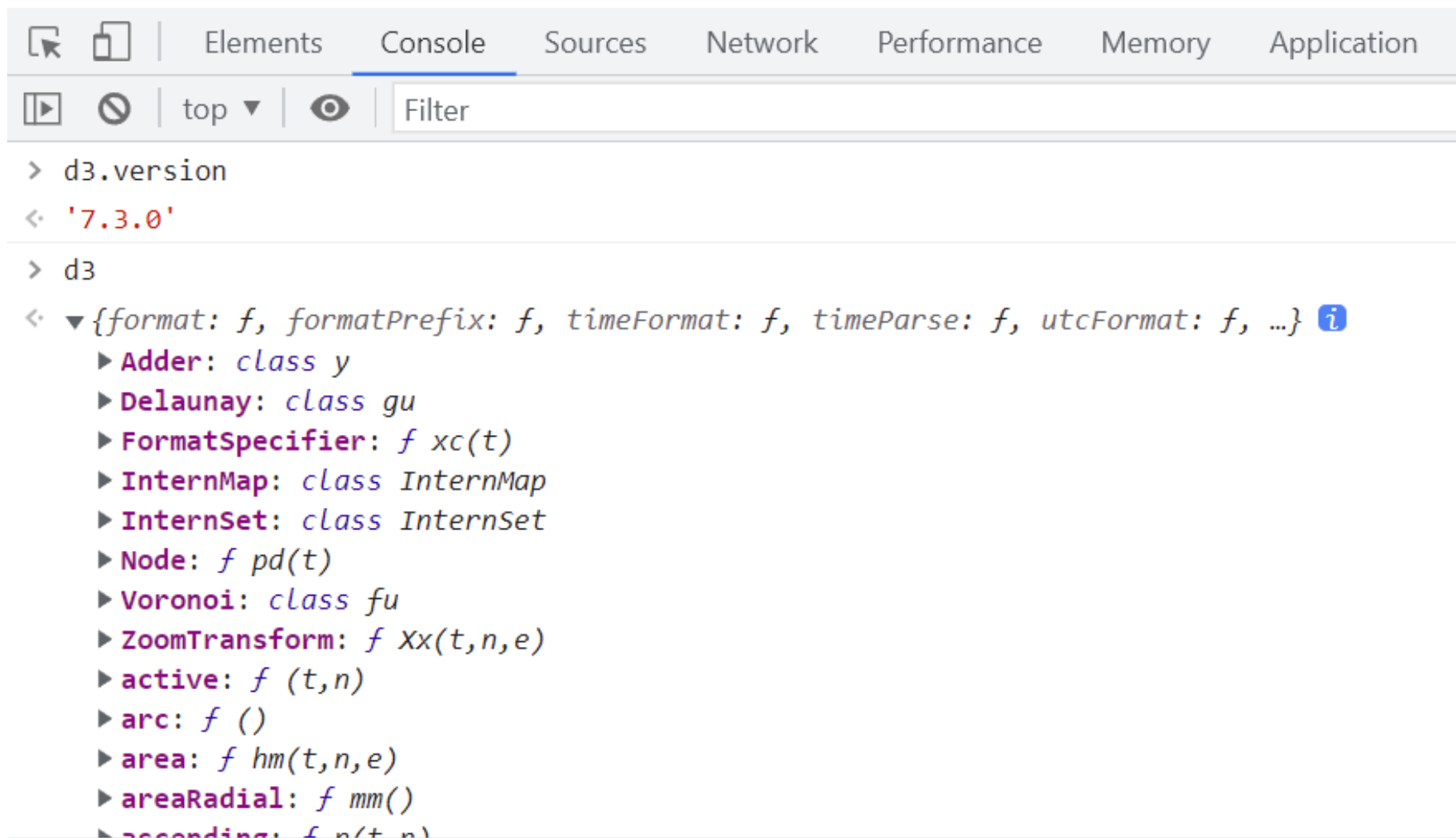
# 執行

- Open with Live Server
- 瀏覽器 -> 右上角 Menu -> 更多工具 -> 開發人員工具
- Console 輸入  
d3.version
- 確認是否有看到版本號



# 瀏覽D3.js

- 在console輸入d3



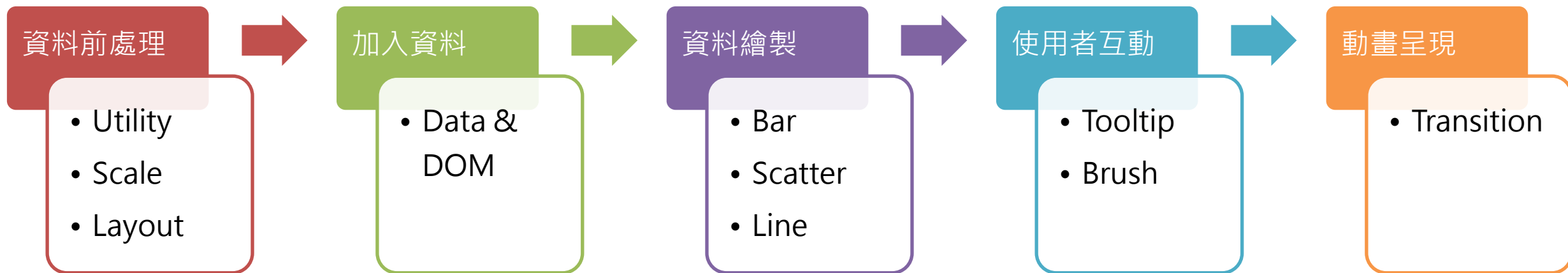
The screenshot shows a web browser's developer console with the 'Console' tab selected. The console displays the following output:

```
> d3.version
< '7.3.0'

> d3
< ▼ {format: f, formatPrefix: f, timeFormat: f, timeParse: f, utcFormat: f, ...} ⓘ
  ▶ Adder: class y
  ▶ Delaunay: class gu
  ▶ FormatSpecifier: f xc(t)
  ▶ InternMap: class InternMap
  ▶ InternSet: class InternSet
  ▶ Node: f pd(t)
  ▶ Voronoi: class fu
  ▶ ZoomTransform: f Xx(t,n,e)
  ▶ active: f (t,n)
  ▶ arc: f ()
  ▶ area: f hm(t,n,e)
  ▶ areaRadial: f mm()
  ▶ ascending: f n(t,n)
```

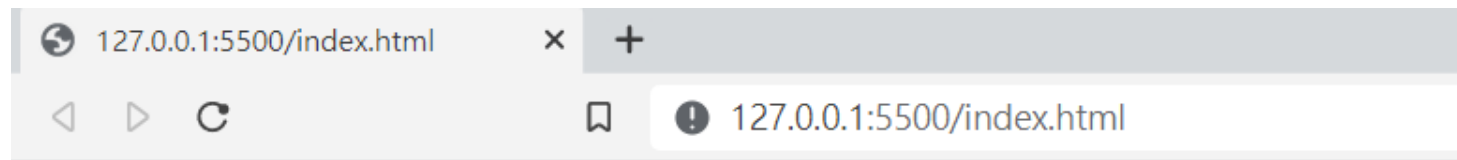


# 資料視覺化 與 D3.js 模組





# 使用SVG繪圖



台灣男生平均身高 173.5 cm

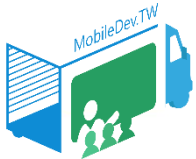
台灣女生平均身高 161.5 cm



# 使用SVG繪圖

```
<!DOCTYPE html>
<html>
  <head>
    <meta charset="utf-8">
    <title></title>
    <meta name="description" content="">
    <link rel="stylesheet" href="">
  </head>
  <body>
    <svg width="500" height="300">
      <line x1="100" y1="100" x2="273.5" y2="100" stroke="black"></line>
      <circle cx="273.5" cy="100" r="3"></circle>
      <text x="100" y="120">台灣男生平均身高 173.5 cm</text>

      <line x1="100" y1="200" x2="261.5" y2="200" stroke="black"></line>
      <circle cx="261.5" cy="200" r="3"></circle>
      <text x="100" y="220">台灣女生平均身高 161.5 cm</text>
    </svg>
  </body>
</html>
```

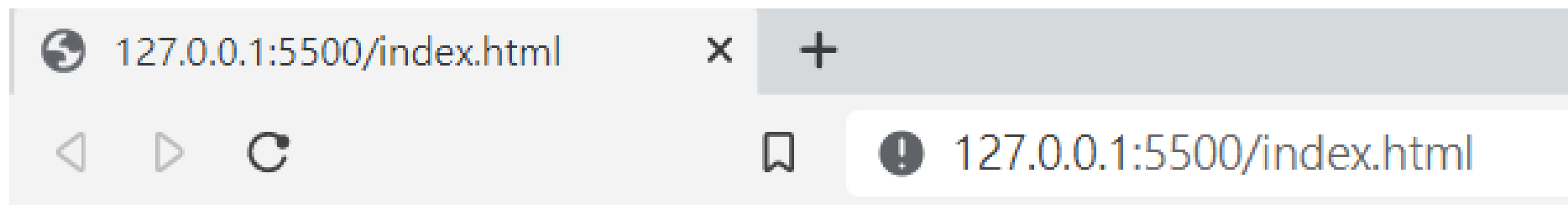


# 可不可以從0開始?

```
<!DOCTYPE html>
<html>
  <head>
    <meta charset="utf-8">
    <title></title>
    <meta name="description" content="">
    <link rel="stylesheet" href="">
  </head>
  <body>
    <svg width="500" height="300">
      <line x1="0" y1="0" x2="173.5" y2="0" stroke="black"></line>
      <circle cx="173.5" cy="0" r="3"></circle>
      <text x="0" y="20">台灣男生平均身高 173.5 cm</text>

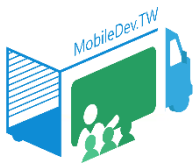
      <line x1="0" y1="100" x2="161.5" y2="100" stroke="black"></line>
      <circle cx="161.5" cy="100" r="3"></circle>
      <text x="0" y="120">台灣女生平均身高 161.5 cm</text>
    </svg>
  </body>
</html>
```

# 結果變成這樣



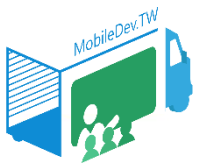
台灣男生平均身高 173.5 cm

台灣女生平均身高 161.5 cm

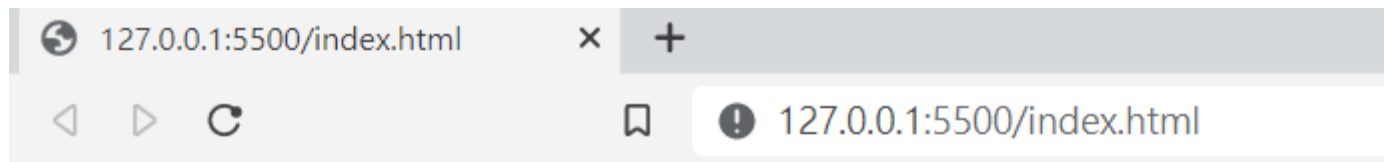


# g group

```
<svg width="500" height="300">  
  <g transform="translate(100,100)">  
    <line x1="0" y1="0" x2="173.5" y2="0" stroke="black"></line>  
    <circle cx="173.5" cy="0" r="3"></circle>  
    <text x="0" y="20">台灣男生平均身高 173.5 cm</text>  
  
    <line x1="0" y1="100" x2="161.5" y2="100" stroke="black"></line>  
    <circle cx="161.5" cy="100" r="3"></circle>  
    <text x="0" y="120">台灣女生平均身高 161.5 cm</text>  
  </g>  
</svg>
```



# g group



**(100,100)**



台灣男生平均身高 173.5 cm



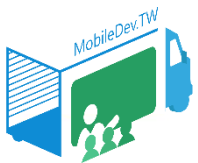
台灣女生平均身高 161.5 cm

# 分成兩組

- 結果相同，但座標與資料更一致

```
<svg width="500" height="300">
  <g transform="translate(100,100)">
    <line x1="0" y1="0" x2="173.5" y2="0" stroke="black"></line>
    <circle cx="173.5" cy="0" r="3"></circle>
    <text x="0" y="20">台灣男生平均身高 173.5 cm</text>
  </g>
  <g transform="translate(100,200)">
    <line x1="0" y1="0" x2="161.5" y2="0" stroke="black"></line>
    <circle cx="161.5" cy="0" r="3"></circle>
    <text x="0" y="20">台灣女生平均身高 161.5 cm</text>
  </g>
</svg>
```





# D3.js + SVG

- index.html

```
<!DOCTYPE html>
<html>
  <head>
    <meta charset="utf-8">
    <title></title>
  </head>
  <body>
    <script src="//unpkg.com/d3"></script>
    <script src="main.js"></script>
  </body>
</html>
```



# main.js

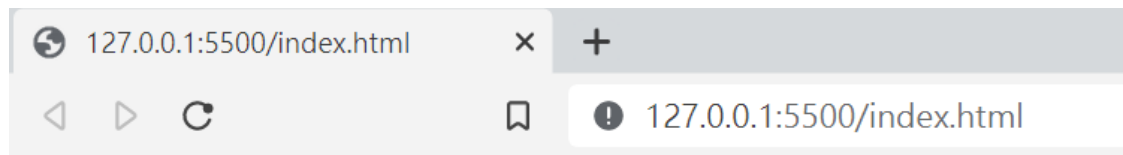
```
const svg = d3.select('body')
    .append('svg')
    .attr('width', 500)
    .attr('height', 300);

const height_male = svg.append('g')
    .attr('transform', 'translate(100,100)');

height_male.append('line')
    .attr('x1', 0).attr('x2', 173.5).style('stroke', 'black');
height_male.append('circle').attr('cx', 173.5).attr('cy', 0).attr('r', 3);
height_male.append('text').attr('x', 0).attr('y', 20).text("台灣男生平均身高173.5 cm");
```

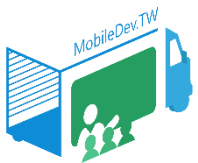
# 練習

- 使用D3.js+SVG，加上女生的平均身高



台灣男生平均身高 173.5 cm

台灣女生平均身高 161.5 cm



# 取得資料

- 本機或遠端
  - csv檔
  - json檔
  - 多檔
  - API存取

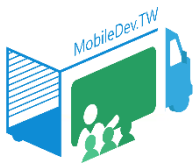


# index.html

```
<!DOCTYPE html>
<html>
  <head>
    <meta charset="utf-8">
    <title></title>
    <link rel="stylesheet" href="style.css">
  </head>
  <body>

    <script src="//unpkg.com/d3"></script>
    <script src="main.js"></script>

  </body>
</html>
```



# main.js

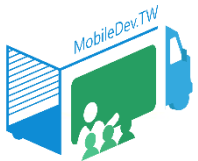
- 取得本機單一csv檔或json檔

```
//get csv file
```

```
d3.csv('data/harry_potter.csv').then(  
  res =>{  
    console.log('Local CSV:',res)  
  }  
);
```

```
//get json file
```

```
d3.json('data/harry_potter.json').then(  
  res =>{  
    console.log('Local json:',res)  
  }  
);
```

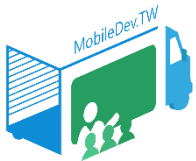


# main.js

- 同時取得本機多檔

```
//get local multi-files
const potter = d3.csv('data/harry_potter.csv');
const rings = d3.csv('data/lord_of_the_rings.csv');

Promise.all([potter, rings]).then(
  res =>{
    console.log('potter:', res[0]);
    console.log('rings:', res[1]);
  }
);
```



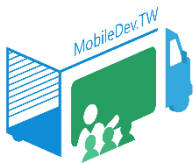
# main.js

- 合併多檔

```
//get local multi-files
const potter = d3.csv('data/harry_potter.csv');
const rings = d3.csv('data/lord_of_the_rings.csv');

Promise.all([potter, rings]).then(
  res =>{
    console.log('Multiple Request:', res);
    console.log('Concat:', [...res[0], ...res[1]]);
    //console.log('potter:', res[0]);
    //console.log('rings:', res[1]);
  }
);
```





# main.js

- 取得網路資料

```
//get internet json
```

```
d3.json('https://api.themoviedb.org/3/search/movie?api_key=YourKeyHere&language=zh-TW&query=%E7%80%91%E5%B8%83').then(  
  res => {  
    console.log('API json:', res)  
  }  
);
```