

物聯網智慧電力系統 實作課程

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2016.02.18

Highcharts 資料視覺化實作

章節目標

- 瞭解感測器資料由資料庫到前端網頁呈現流程
- 學習Highcharts工具函式

資料視覺化工具

- 使資料庫中龐大、繁雜的數據變成有價值的資料
- 降低使用者門檻，使資料圖表化變得容易
- 有圖有真相

Leaflet 



HIGHCHARTS

iCharts



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CHARTS

Highcharts

- Highcharts 是一個開源的JavaScript圖表函式庫，我們可以搭配JavaScript使用在網頁前端來建立各種統計圖表。

特點:

- 對於非商業用途的網站可直接使用不需要授權或付費。
- 完全不需要配置Java、PHP執行環境，使用CDN(Content Delivery Network)的方式載入jQuery和Highcharts的函式庫即可使用。

```
<script src="https://ajax.googleapis.com/ajax/libs/jquery/1.11.1/jquery.min.js"></script>  
<script src="https://code.highcharts.com/highcharts.js"></script>
```

Highcharts

<http://www.highcharts.com/demo>

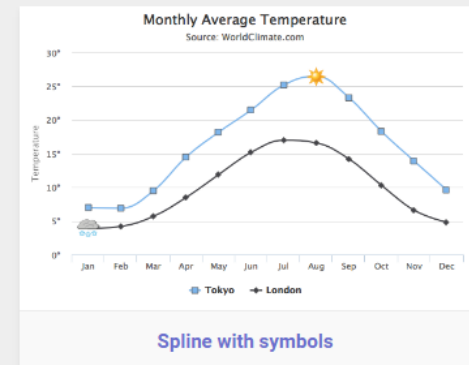
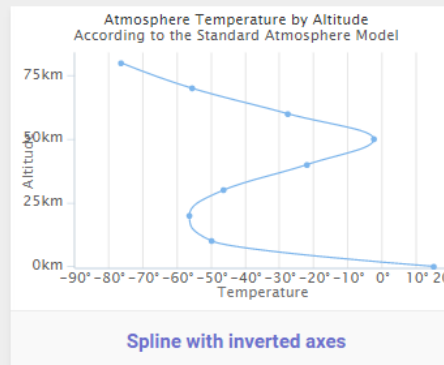
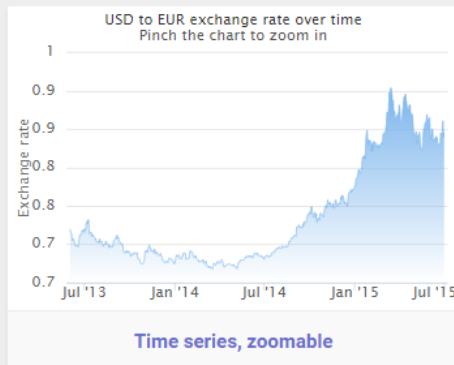
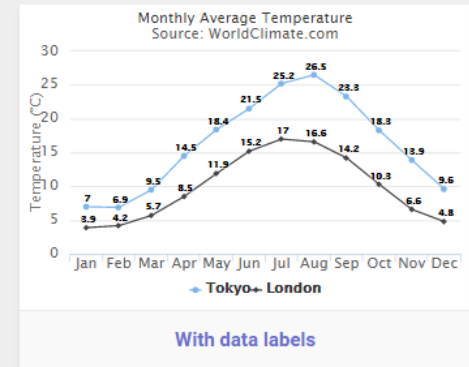
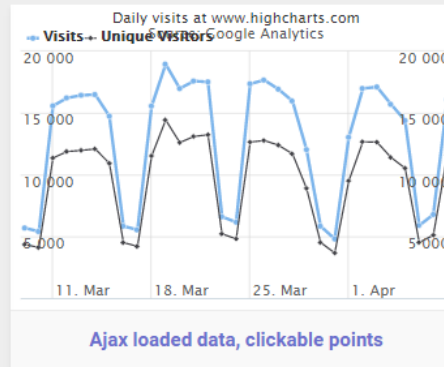
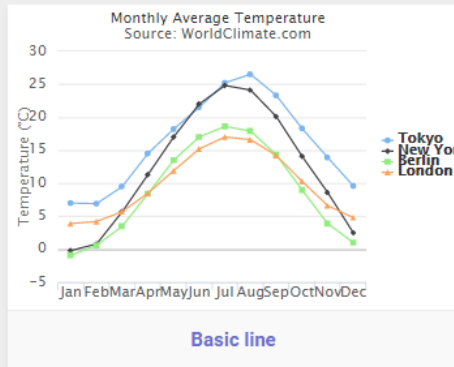
HIGHCHARTS DEMO DOCS SUPPORT PRODUCTS BLOG COMMUNITY

ABOUT US PLUGINS SHOP

Highcharts Demos

DEFAULT DARK UNICA SAND SIGNIKA GRID LIGHT

Line charts



Highcharts 官網 demo 頁面

HIGHCHARTS DEMO DOCS SUPPORT PRODUCTS ABOUT US PLUGINS SHOP

Highcharts Demos > Update options after render

DEFAULT DARK UNICA SAND SIGNIKA GRID LIGHT

LINE CHARTS >
AREA CHARTS >
COLUMN AND BAR CHARTS >
PIE CHARTS >
SCATTER AND BUBBLE CHARTS >
COMBINATIONS >
DYNAMIC CHARTS >
Spline updating each second
Click to add a point
Master-detail chart
Update options after render
Responsive chart
3D CHARTS >
GAUGES >
HEAT AND TREE MAPS >
MORE CHART TYPES >

Chart.update

Plain

Month	Value
Jan	25
Feb	65
Mar	105
Apr	125
May	145
Jun	175
Jul	135
Aug	145
Sep	215
Oct	195
Nov	95
Dec	55

PLAIN INVERTED POLAR

VIEW OPTIONS > EDIT IN JSFIDDLE >

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Highcharts官網demo頁面

- JSFiddle為一個雲端線上的網頁編輯器，提供使用者雲端代管程式碼的服務，讓使用者可以將任意網頁內容放上去測試、驗證、存檔、分享。

Run Save Tidy Collaborate

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Fiddle Meta
Highcharts Demo
author(s):
Torstein Hønsi
Add title to make the fiddle public.
External Resources
AJAX Requests
Legal, Credits and Links
[JSFiddle Roadmap](#)
suggest and vote for features

```

1 <script src="https://code.highcharts.com/highcharts.js"></script>
2 <script src="https://code.highcharts.com/modules/data.js"></script>
3 <script src="https://code.highcharts.com/modules/drilldown.js"></script>
4
5 <div id="container" style="min-width: 310px; height: 400px; margin: 0 auto"></div>

```

// Create the chart
Highcharts.chart('container', {
 chart: {
 type: 'column'
 },
 title: {
 text: 'Browser market shares. January, 2015 to May, 2015'
 },
 subtitle: {
 text: 'Click the columns to view versions. Source: netmarketshare.com.'
 },
 xAxis: {
 type: 'category'
 },
 yAxis: {
 title: {
 text: 'Total percent market share'
 }
 },
 legend: {
 enabled: false
 },
 plotOptions: {
 series: {
 borderWidth: 0,
 dataLabels: {

Browser market shares. January, 2015 to May, 2015 RESULT
Click the columns to view versions. Source: netmarketshare.com.

Browser	Market Share (%)
Microsoft Internet Explorer	56.3%
Chrome	24.0%
Firefox	10.4%
Safari	4.8%
Opera	0.9%
Proprietary or Undetectable	0.2%

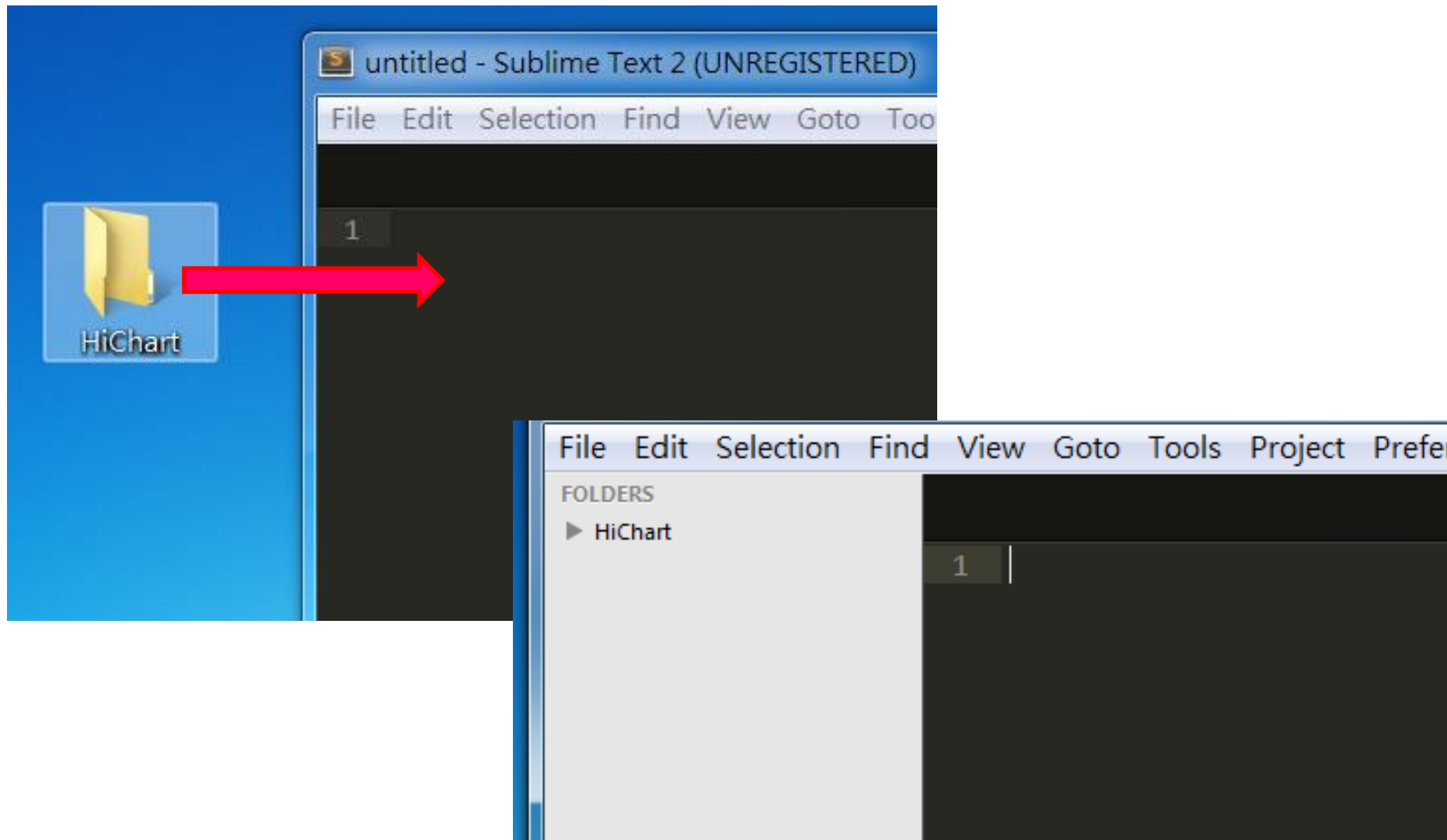
Highcharts.com

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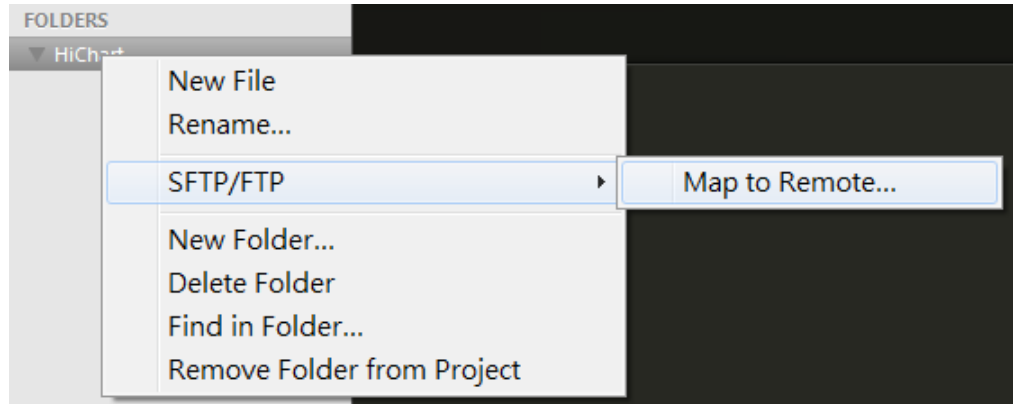
先備知識

- **HTML**(HyperText Markup Language)
 - 用來建立網頁的基本語言，常搭配CSS和JavaScript來設計出網頁前端的顯示介面。
- **JavaScript**
 - 是一種解釋性程式語言，常被用來描述網頁內容、讀寫HTML元素或是添加網頁互動行為。
- **jQuery**
 - jQuery是一個JavaScript的函式庫，同樣算是JavaScript，其簡化了HTML與JavaScript之間的操作。
- **PHP**
 - PHP包含許多常被用來操作MySQL資料庫的函式。

(一) 建立本地專案目錄



設置遠端專案目錄



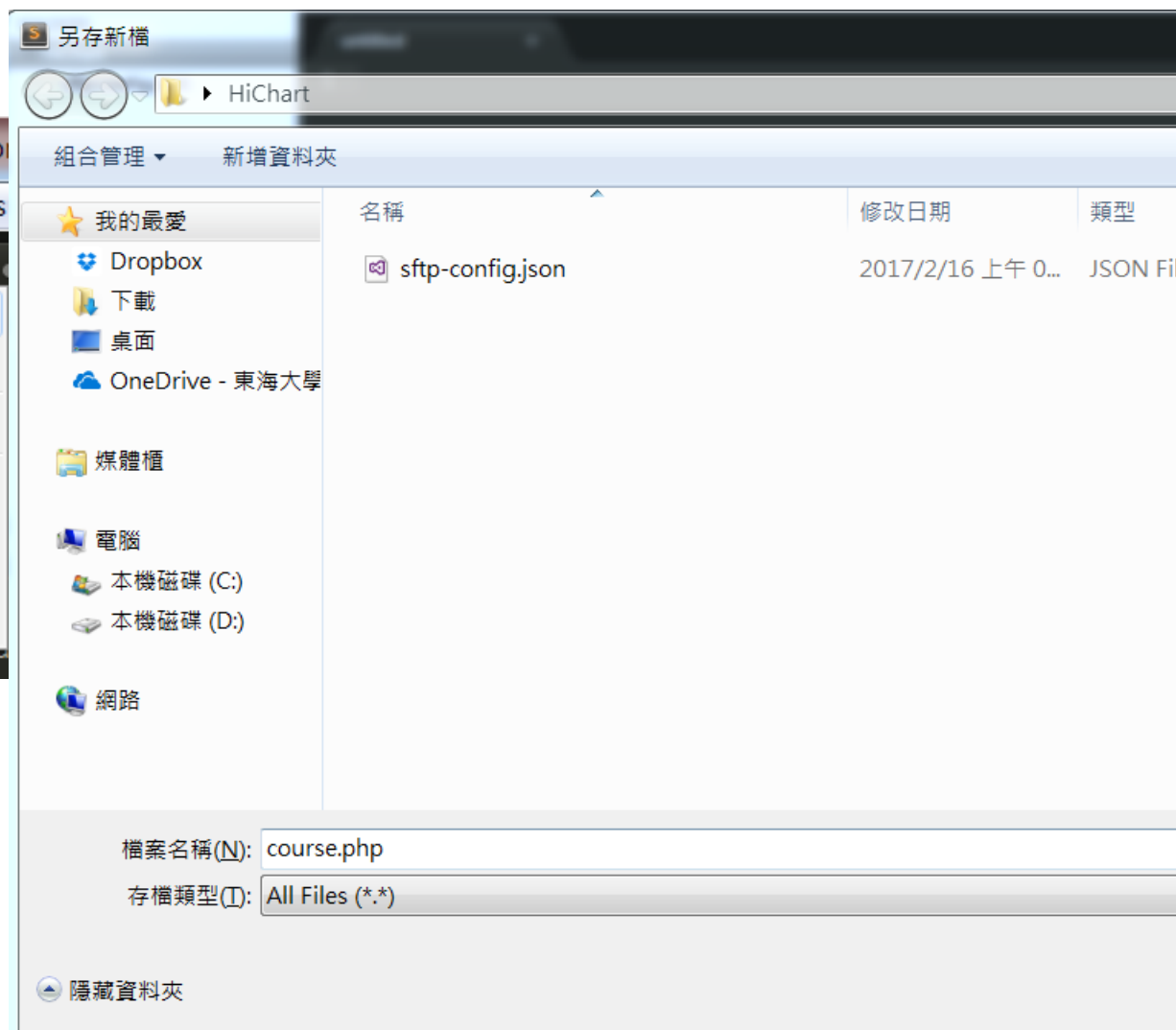
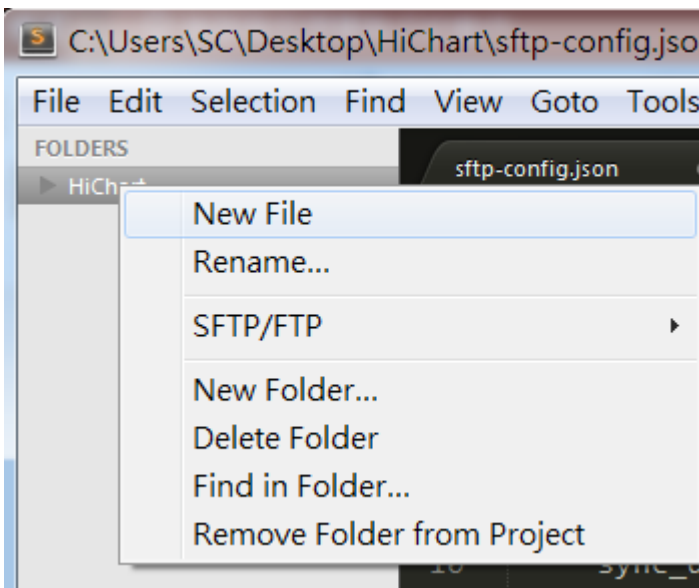
FOLDERS
▼ HiChart
sftp-config.json

```
1 {  
2     // The tab key will cycle through the settings when first created  
3     // Visit http://wbond.net/sublime\_packages/sftp/settings for help  
4  
5     // sftp, ftp or ftps  
6     "type": "sftp",  
7  
8     "save_before_upload": true,  
9     "upload_on_save": false,  
10    "sync_down_on_open": false,  
11    "sync_skip_deletes": false,  
12    "sync_same_age": true,  
13    "confirm_downloads": false,  
14    "confirm_sync": true,  
15    "confirm_overwrite_newer": false,  
16  
17    "host": "example.com",  
18    "user": "username",  
19    // "password": "password",  
20    // "port": "22",  
21  
22    "remote_path": "/example/path/",
```

反白後按Ctrl+/取消註解

開始編輯

• 新增.php檔



(二) 前端框架

- 貼上範例前端框架語法，並儲存。

```
FOLDERS
▼ HiChart
  course.php
  sftp-config.json

course.php
1 <!DOCTYPE html>
2 <!-- saved from url=(0043)http://getbootstrap.com/examples/dashboard/ -->
3 <html lang="en">
4   <head>
5     <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
6     <meta http-equiv="X-UA-Compatible" content="IE=edge">
7     <meta name="viewport" content="width=device-width, initial-scale=1">
8     <meta name="description" content="">
9     <meta name="author" content="">
10    <link rel="icon" href="">
11    <title>物聯網智慧電力系統實作課程</title>
12    <link href="./Dashboard Template for Bootstrap_files/bootstrap.min.css" rel="stylesheet">
13    <link href="./Dashboard Template for Bootstrap_files/ie10-viewport-bug-workaround.css" rel="stylesheet">
14    <link href="./Dashboard Template for Bootstrap_files/dashboard.css" rel="stylesheet">
15    <script src="./Dashboard Template for Bootstrap_files/ie-emulation-modes-warning.js"></script>
16  </head>
17  <body>
18    <nav class="navbar navbar-inverse navbar-fixed-top">
19      <div class="container-fluid">
20        <div class="navbar-header">
21          <button type="button" class="navbar-toggle collapsed" data-toggle="collapse" data-target="#navbar">
22            <span class="sr-only">Toggle navigation</span>
23            <span class="icon-bar"></span>
24            <span class="icon-bar"></span>
25            <span class="icon-bar"></span>
26          </button>
27          <a class="navbar-brand" href="">Project name</a>
28        </div>
29        <div id="navbar" class="navbar-collapse collapse">
30          <ul class="nav navbar-nav navbar-right">
31            <li><a href="">Dashboard</a></li>
32            <li><a href="">Settings</a></li>
33            <li><a href="">Profile</a></li>
```

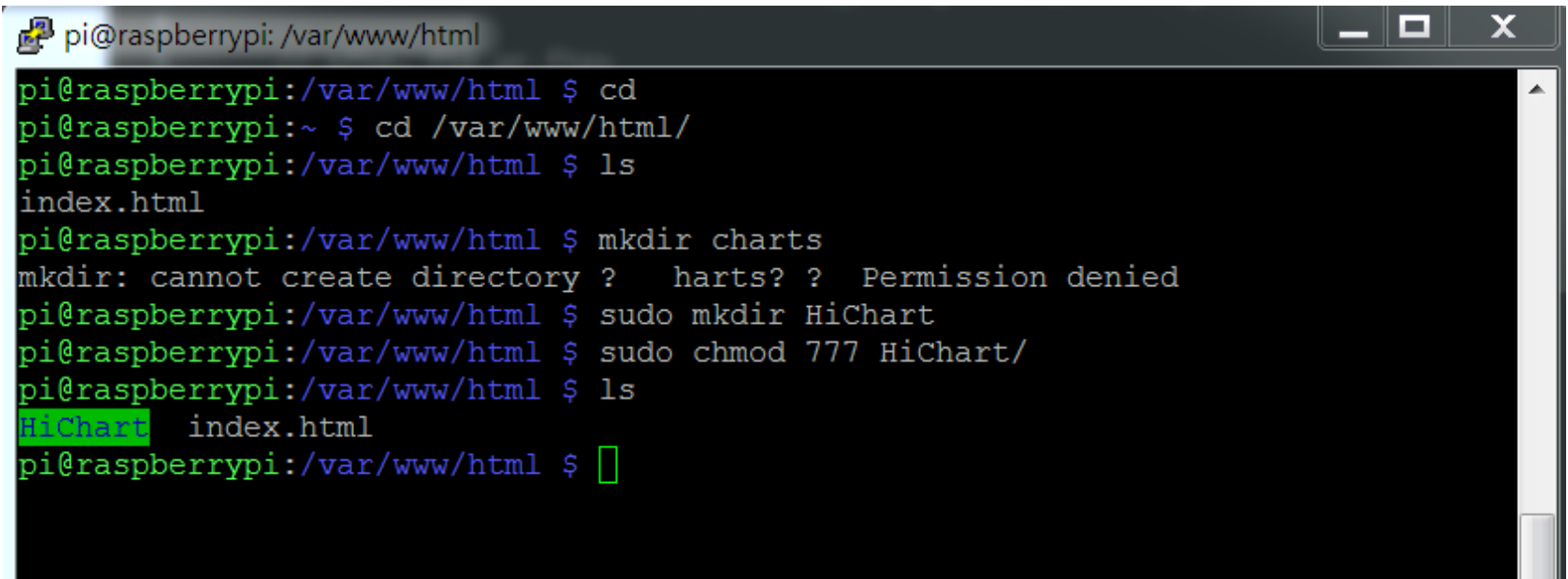
同步至伺服器端

- 於Server端創建目錄並給予讀取權限

```
# cd /var/www/html
```

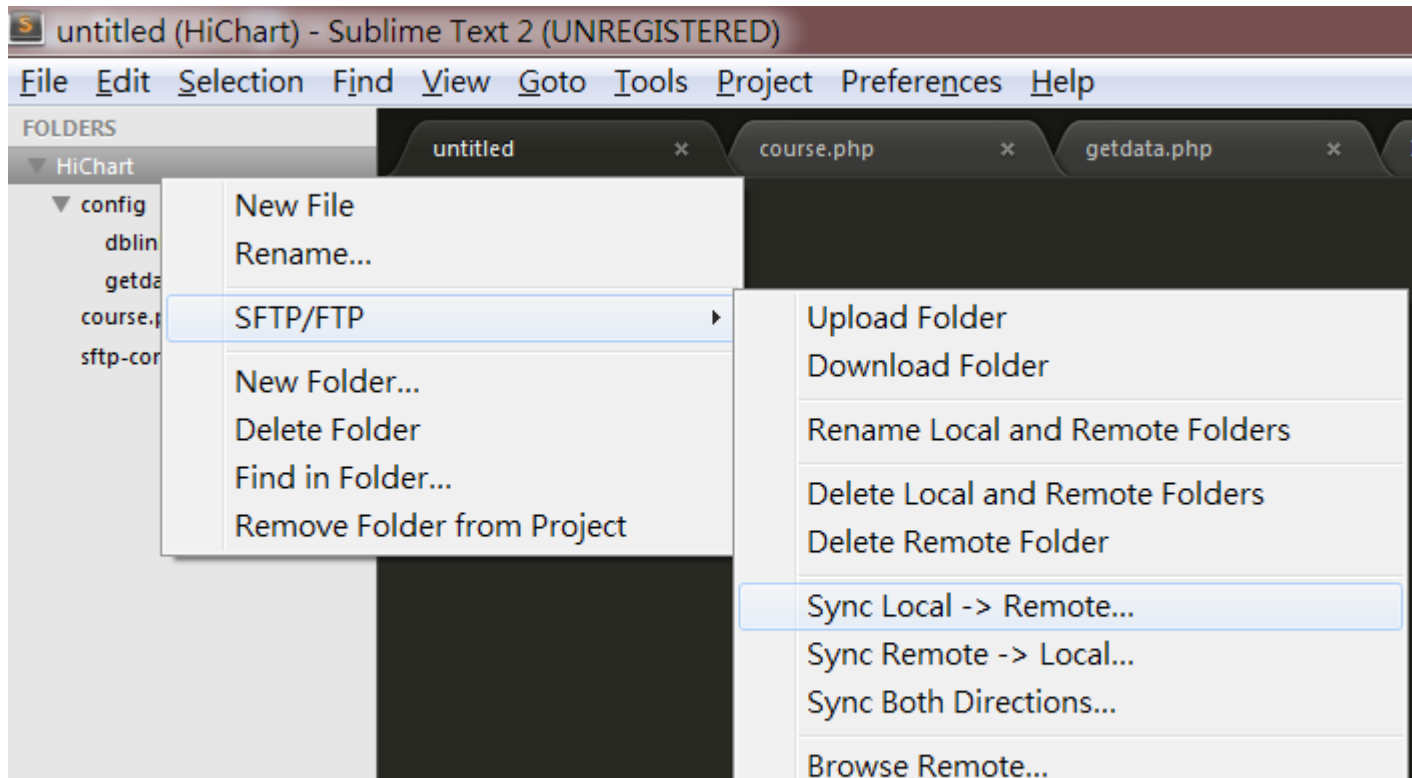
```
# mkdir HiChart
```

```
# sudo chmod 777 HiChart
```



```
pi@raspberrypi: /var/www/html  
pi@raspberrypi:/var/www/html $ cd  
pi@raspberrypi:~ $ cd /var/www/html/  
pi@raspberrypi:/var/www/html $ ls  
index.html  
pi@raspberrypi:/var/www/html $ mkdir charts  
mkdir: cannot create directory ? harts? ? Permission denied  
pi@raspberrypi:/var/www/html $ sudo mkdir HiChart  
pi@raspberrypi:/var/www/html $ sudo chmod 777 HiChart/  
pi@raspberrypi:/var/www/html $ ls  
HiChart index.html  
pi@raspberrypi:/var/www/html $
```


同步至伺服器端



```
pi@raspberrypi:~ $ cd /var/www/html/  
pi@raspberrypi:/var/www/html $ ls  
HiChart index.html  
pi@raspberrypi:/var/www/html $ cd HiChart/  
pi@raspberrypi:/var/www/html/HiChart $ ls  
config course.php  
pi@raspberrypi:/var/www/html/HiChart $
```

(三) 繪製Highcharts圖表

- 加入空白div區塊到HTML語法中

```
<div id="container_all" style="min-width: 310px; height: 400px; margin: 2% auto;"></div>
```

- 於Javascript建構子中以div的id屬性選擇該區塊放置初始化圖表，再填入固定常數。

```
function chart all() {  
    $('#container_all').highcharts({  
        chart: {  
            type: 'spline'  
        },  
        title: {  
            text: "<div style=\"font-family:Microsoft JhengHei;\">本日用電情形</div>"  
        },  
        xAxis: {  
            labels: {  
                formatter: function() {  
                    return '<span style="font-family:Microsoft JhengHei; color:black">' + this.value + '點</span>';  
                }  
            },  
        },  
        yAxis: {  
            title: {  
                text: '用電量',  
            },  
            labels: {  
                formatter: function() {  
                    return this.value + " 瓦";  
                }  
            },  
        },  
    });  
}
```

```
function getData(){
    var sendInfo = {
        date: date
    };
    var daySum = 0;
    chart_all = $('#container_all').highcharts();

    //get chart data
    $.ajax({
        url: "config/getdata.php",
        type: "GET",
        dataType: "json",
        cache: false, // don't cache the result
        success: function(msg) {
            var watt = [],
                hr = [],
                dayAll = [];
            msg.forEach(function(entry) {
                h = entry.hr;
                hr.push(h);
                if (isNaN(dayAll[parseInt(entry.hr)])) {
                    dayAll[parseInt(entry.hr)] = parseFloat(entry.P);
                    daySum += parseFloat(entry.P);
                } else {
                    dayAll[parseInt(entry.hr)] += parseFloat(entry.P);
                    daySum += parseFloat(entry.P);
                }
            });

            chart_all.addSeries({
                name: "本日用電",
                data: dayAll,
            }, true);
            chart_all.xAxis[0].setCategories(hr, true, true);
            chart_all.redraw();
        },
        error: function(xhr, status, error) {
            alert(xhr.status + error);
        },
        data: sendInfo
    });
}
```

jQuery / AJAX

- 與伺服器進行資料請求和交換的方式
- 由Client端預先處理部分需求，降低Server負擔
- **url**：指定欲呼叫的Server位址
- **data**：欲傳送至Server端的資料
- **type**：資料請求方式，**GET**或是**POST**
- **dataType**：伺服器回傳資料型態，如json,xml
- **success**：請求成功時執行的函式
- **error**：請求失敗時執行的函式
- **complete**：請求完成執行的函式，無論成功或失敗

將.csv匯入MySQL資料庫

The screenshot shows the phpMyAdmin web interface for a MySQL database on localhost. The left sidebar contains a tree view of databases: 'DHT11', 'information_schema', 'mysql', 'performance_schema', and 'phpmyadmin'. The main panel displays the 'Import' tab, which is highlighted with a red rectangular box. Below the tabs, the 'General' (一般設定) section is visible, showing options for 'Modify password' (修改密碼) and 'Server connection encoding and sorting' (伺服器連線編碼與排序) set to 'utf8mb4_general_ci'. The 'Appearance' (外觀設定) section below it shows 'Language' (語系) set to 'Chinese - Chinese traditional' (中文 - Chinese traditional), 'Theme' (主題) set to 'pmahomme', and 'Font size' (字體大小) set to '82%'. A 'More settings' (更多設定) link is also present.

匯入到目前伺服器

要匯入的檔案:

可使用已壓縮 (gzip, bzip2, zip) 或未壓縮的檔案。
壓縮檔案名稱必須以 **[格式][壓縮方式]** 結尾。如: **.sql.zip**

由電腦上傳 **選擇檔案** pr_2017-02-15.csv (上限: 2,048 KB)

檔案編碼: utf-8 ▼

部分匯入:

☒ 允許中斷匯入的動作, 當偵測到執行時間已接近 PHP 執行時間的限制時。(若要匯入大型檔案這是必須)

跳過此數量的查詢(SQL)或者行數(其他格式), 由第一行開始:

格式:

CSV ▼

備註:

內容跳脫符號:

格式選

換行符號:

☐ 檔案第一行包含資料表的欄位名稱 (若未選此項, 首行將被認為是資料)

☐ 新增錯誤時不中斷程式

執行

將.csv匯入MySQL資料庫

The screenshot shows the phpMyAdmin interface. On the left, the database list includes 'CSV_DB'. The main panel displays a green success message: '匯入成功完成，共執行了 3 個查詢指令。' (Import completed successfully, 3 queries executed). Below the message, it lists the structures created or modified: 'CSV_DB (選項)' and 'TBL_NAME (結構) (選項)'. The file 'pm_2017-02-15.csv' is mentioned at the bottom of the message box.

匯入成功完成，共執行了 3 個查詢指令。

下列結構被建立或修改。您可以：

- 點選結構的名稱查看內容。
- 點選 "選項" 連結以修改項目的設定值。
- 點選 "結構" 連結以編輯。
- [CSV_DB \(選項\)](#)
 - [TBL_NAME \(結構\) \(選項\)](#)

(pm_2017-02-15.csv)

This screenshot shows the 'Structure' tab for the 'TBL_NAME' table in the 'CSV_DB' database. The table has 1,451 rows and is using the InnoDB engine with utf8_general_ci collation. The size is 256 KB. The interface includes a table of columns and actions, and a summary of the table's statistics.

資料表	動作	資料列數	型態	編碼與排序	大小	資料分
TBL_NAME	瀏覽 結構 搜尋 新增 清空 刪除	1,451	InnoDB	utf8_general_ci	256 KB	
1 張資料表	總計	1,451	InnoDB	utf8_general_ci	256 KB	

全選 已選擇項目:

將.csv匯入MySQL資料庫

phpMyAdmin

最近使用 | 我的最愛

- 新增
- CSV_DB
 - 新增
 - TBL_NAME
- DHT11
- information_schema
- mysql
- performance_schema
- phpmyadmin

伺服器: localhost » 資料庫: CSV_DB » 資料表: TBL_NAME

瀏覽 | 結構 | SQL | 搜尋 | 新增 | 匯出 | 匯入 | 權限 | 操作 | 追蹤 | 觸發器

⚠ 目前選擇的項目不含唯一(Unique)的資料欄位，將無法執行修改、複製、刪除等相關的功能。

✓ 顯示第 0 - 24 列 (總計 1449 筆, 查詢花費 0.0030 秒。)

SELECT * FROM `TBL_NAME`

☐ 效能分析 [本]

1 > >> | 資料列數: 25 | 搜尋資料列: 搜尋此資料表

+ 選項

COL 1	COL 2	COL 3	COL 4	COL 5	COL 6	COL 7	COL 8	COL 9	COL 10	COL 11	COL 12	COL 13	COL 14	COL 15	COL 16	COL 17	COL 18	COL 19
2017/2/15 00:00	1	220	c19431			81	0	0	257900	258300	0.9	0	0	114.2	0	0	0.717	
2017/2/15 00:01	1	220	c19431			81	0	0	257900	258400	1.0	0	0	114.0	0	0	0.714	
2017/2/15 00:02	1	220	c19431			82	0	0	257900	258400	1.0	0	0	114.0	0	0	0.713	
2017/2/15	1	220	c19431			81	0	0	257900	258400	1.0	0	0	114.2	0	0	0.716	

連接資料庫

FOLDERS

- ▼ HiChart
 - ▼ config
 - dblink.php
 - getdata.php
 - course.php
 - sftp-config.json

dblink.php

```
1  <?php
2      $ip = 'localhost';
3      $username = 'root';
4      $pwd = 'hpc123';
5      $dbname = 'CSV_DB';
6      $Link = mysql_connect($ip , $username , $pwd );
7      mysql_query("set names utf8");
8      mysql_select_db($dbname);
9      if (!$Link) {
10         die(' fail : ' . mysql_error());
11     }
12  ?>
```

phpMyAdmin

伺服器: localhost » 資料庫: CSV_DB »

瀏覽 結構 SQL 搜尋

⚠ 目前選擇的項目不含唯一(Undique)的資料欄位

✓ 顯示第 0 - 24 列 (總計 1449 筆, 查詢花費 0.00)

SELECT * FROM `TBL_NAME`

1 > >> | 資料列數: 25

PHP mysql_query()

```

1  <?php
2      include_once "dblink.php";
3      // $date = $_GET['date'];
4      // $sql = "SELECT `COL 1`,`COL 7`,`COL 10`,`COL 11`,`COL 15` FROM `TBL_NAME` WHERE `COL 1` LIKE ' ".$date."%' ";
5      $sql = "SELECT `COL 1`,`COL 7`,`COL 10`,`COL 11`,`COL 15` FROM `TBL_NAME` WHERE `COL 1` LIKE '2017-02-15%' ";
6      $result = mysql_query($sql) or die('MySQL query error');
7      $hr1 = 0;
8      $arr = array();
9      $avgP = 0;
10     while($row = mysql_fetch_assoc($result)){
11         $hr2 = intval(substr($row['COL 1'],11,2));
12         if($hr2 != $hr1){
13             array_push($arr, array('hr'=>$hr1,'P'=>round($avgP/60,2)));
14             $hr1 = $hr2;
15             $avgP = 0;
16         }
17         $min = substr($row['COL 1'],14,2);
18         $P = $row['COL 7'];
19         $avgP += $P;
20     }
21     array_push($arr, array('hr'=>$hr2,'P'=>round($avgP/60,2)));
22     echo json_encode($arr);
23     mysql_close($Link);
24     ?>
25

```

172.24.12.38/HiChart/config/getdata.php

```

[{"hr":0,"P":86.72}, {"hr":1,"P":97}, {"hr":2,"P":53.4}, {"hr":3,"P":55.73}, {"hr":4,"P":53.52}, {"hr":5,"P":55.53},
{"hr":6,"P":54.38}, {"hr":7,"P":52.72}, {"hr":8,"P":74.28}, {"hr":9,"P":109.63}, {"hr":10,"P":102.27}, {"hr":11,"P":95.32},
{"hr":12,"P":55.15}, {"hr":13,"P":54.47}, {"hr":14,"P":54.63}, {"hr":15,"P":56.42}, {"hr":16,"P":54.78}, {"hr":17,"P":51.1},
{"hr":18,"P":54.2}, {"hr":19,"P":52.38}, {"hr":20,"P":56.9}, {"hr":21,"P":53.25}, {"hr":22,"P":53.52}, {"hr":23,"P":54.6}]

```

JSON

- 運用純文字為基底來傳輸資料的格式
- **Key-Value**格式儲存
- 常被用在網頁Ajax方式中進行資料交換
- 物件(object)用大括號 { }
 {"科目": "English", "成績": 99}
- 陣列(array)用中括號 []
 [0, 1, 2, 3, 4, 5, 6]
 ["Roy", "Ben", "Jeff"]

JSON

Key

Value

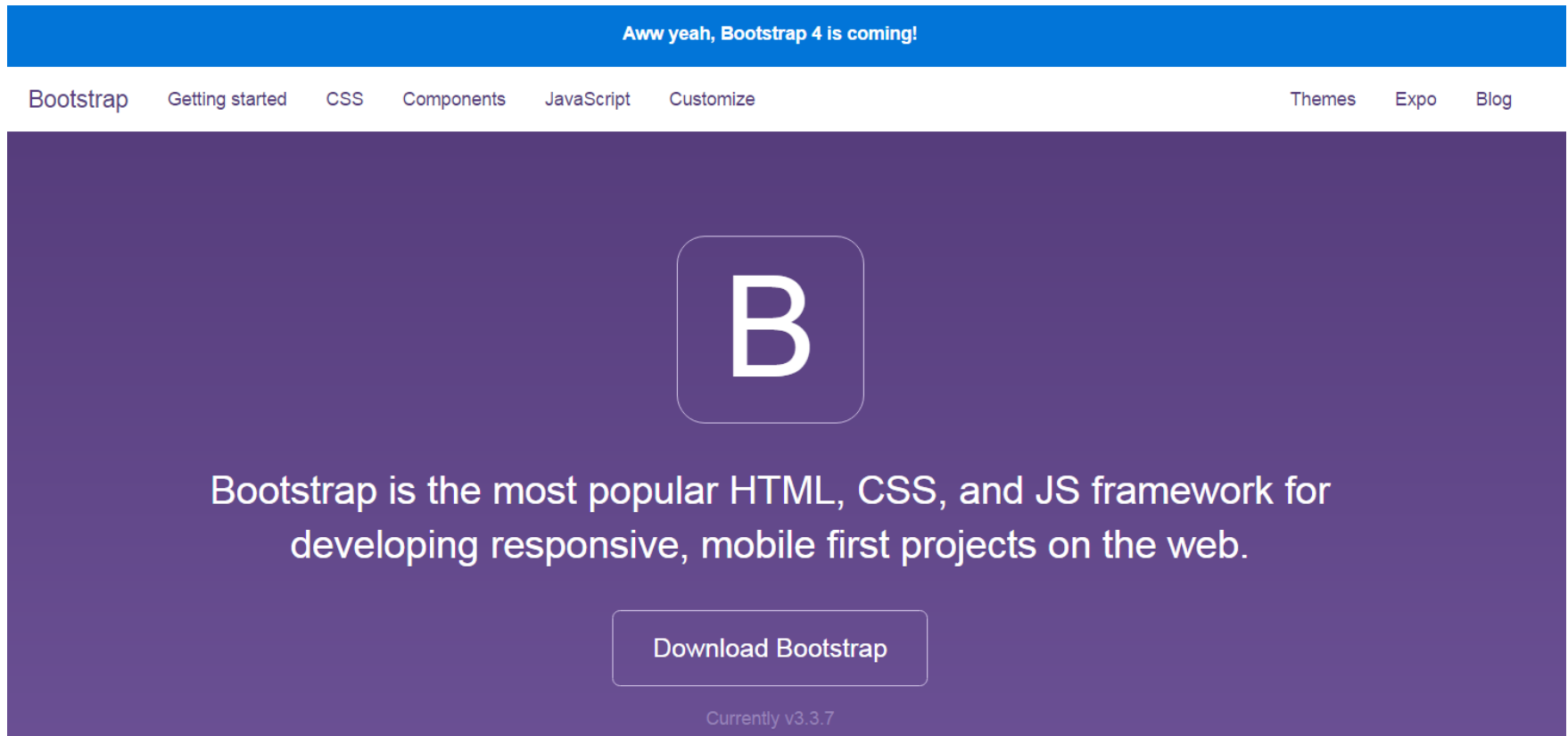
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    "name": "Roy",  
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      "成績": 99  
    }  
  }, {  
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    "成績單": {  
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      "成績": 80  
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]
```


網頁結果檢視



Bootstrap

- <http://getbootstrap.com/>



Bootstrap前端框架範例

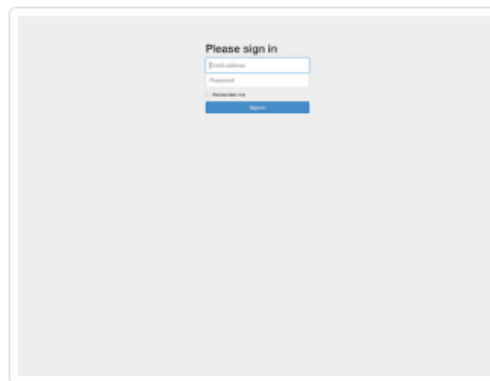
Cover

A one-page template for building simple and beautiful home pages.



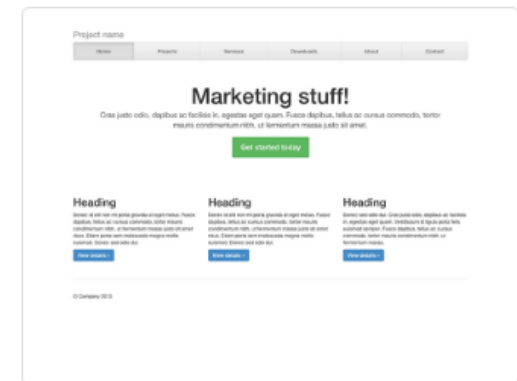
Carousel

Customize the navbar and carousel, then add some new components.



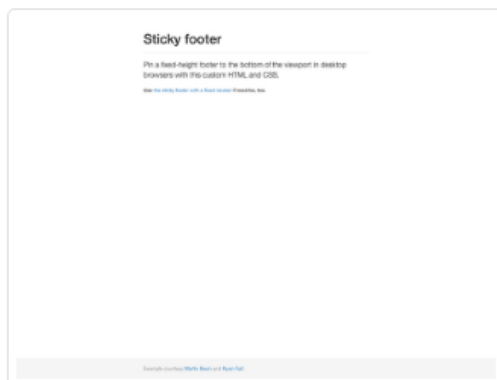
Blog

Simple two-column blog layout with custom navigation, header, and type.



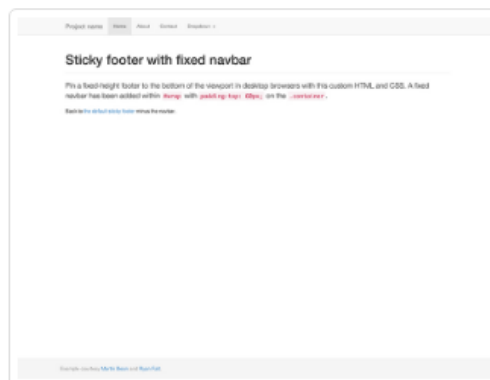
Dashboard

Basic structure for an admin dashboard with fixed sidebar and navbar.



Sign-in page

Custom form layout and design for a simple sign in form.



Justified nav

Create a custom navbar with justified links. Heads up! **Not too Safari friendly.**

感謝聆聽

