



Web Development Fundamentals

使用 **RESTful API** 探索艺术世界

Explore the art world by
using RESTful APIs

May 2021

Microsoft Reactor | Ryan Chung

```
led by player to  
s.load_image("kg.png")  
  
[self]:  
    initialize Dog object and create Text o  
g, self).__init__(image = Dog.image  
    x = games.mouse.x  
    bottom = games.sc  
  
re = games.Text(value = 0, size = 24  
    top = 5, right = gam  
  
reen.add(self.score)  
1 = games.Text(value = 0, size = 24  
    top = 5, left = gam
```



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Reactor



developer.microsoft.com/reactor/
@MSFTReactor on Twitter



使用 RESTful API 探索艺术世界

29 分钟 剩余 • 模块 • 已完成 3 个单元, 共 10 个

★★★★★ 4.7 (45)

对其进行评级

初级

开发人员

学生

Visual Studio Code

了解如何构建基本 API、如何查询 API，以及使用博物馆 API 发现独特艺术品时采用的 Python 和 JavaScript 身份验证策略。

学习目标

在本模块中，将执行以下操作：

- 了解 RESTful API。
- 构建你自己的简单 API。
- 了解连接到外部 API 的各种策略。
- 了解如何查询两个不同的博物馆 API。

先决条件

- 连接 Internet 的浏览器，例如 Microsoft Edge。
- 本地已安装 Node.js。
- 本地已安装 npm。

继续 >

🔖 书签

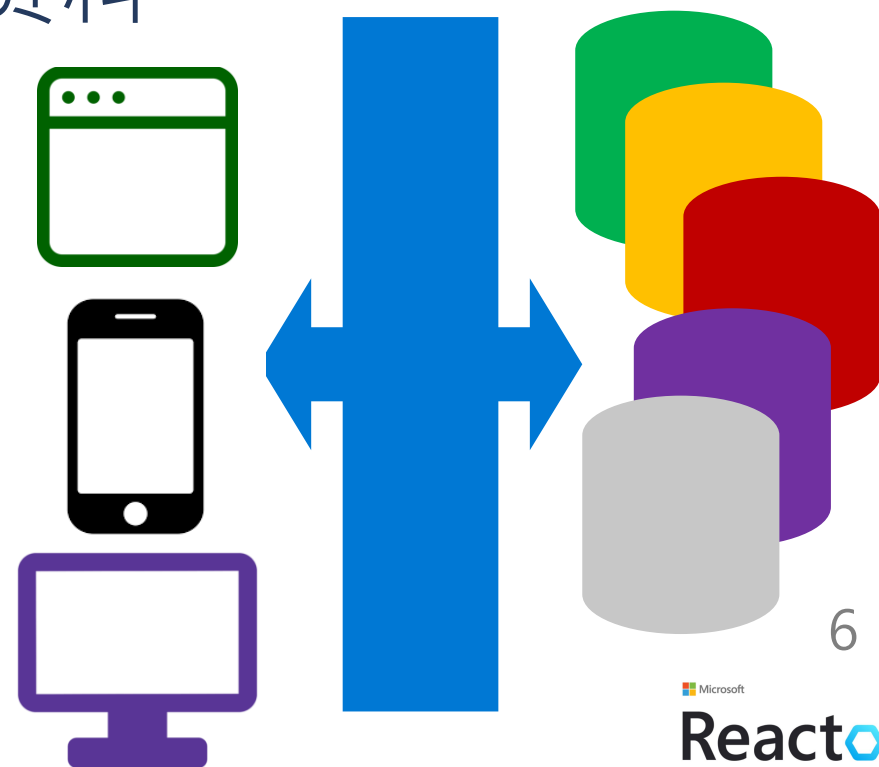
⊕ 添加到集合

学习目标

- 建构一个基本的API
- 如何向API发出请求查询
- 案例 – 博物馆API使用

API(Application Programming Interface)

- 應用程式介面
- 预先定义好的一组规则、沟通的协定
- 方便取得资料、使用资料、回传资料
- REST
 - Representational State Transfer
- 遵循REST原则的API
 - RESTful API



建立一个本地端API

- 安装json-server套件

`npm install -g json-server`

- 建立资料档案

- 使用VS Code，档案 -> 开启资料夹 -> 建立一个练习资料夹
- 建立 db.json档案如下

```
{
  "objects": [
    { "id": 1, "item": "Lise with a Parasol", "artist": "Pierre Auguste Renoir", "collection": "Museum Folkwang, Essen, Germany", "date": "1867"},
    { "id": 2, "item": "The Theatre Box", "artist": "Pierre Auguste Renoir", "collection": "Courtauld Gallery, London, England", "date": "1874"},
    { "id": 3, "item": "Dance in the City", "artist": "Pierre Auguste Renoir", "collection": "Musée d'Orsay, Paris, France", "date": "1883"},
    { "id": 4, "item": "Dance in the Country", "artist": "Pierre Auguste Renoir", "collection": "Musée d'Orsay, Paris, France", "date": "1883"}
  ]
}
```

启动JSON Server

- 开启VS Code整合终端机

`json-server --watch db.json`

```
json-server --watch db.json
```

```
\{^_^}/ hi!
```

```
Loading db.json  
Done
```

```
Resources  
http://localhost:3000/objects
```

```
Home  
http://localhost:3000
```

```
Type s + enter at any time to create a snapshot of the database  
Watching...
```

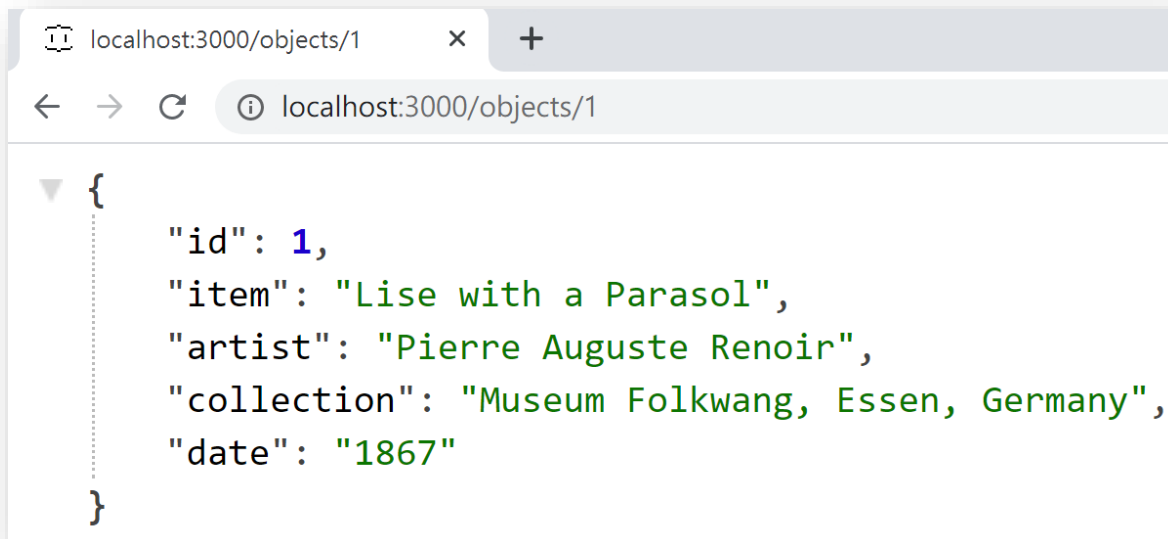

测试本地端API

- 打开浏览器

网址列输入 <http://localhost:3000/objects>

- 个别测试

网址列输入 <http://localhost:3000/objects/1>



```
{
  "id": 1,
  "item": "Lise with a Parasol",
  "artist": "Pierre Auguste Renoir",
  "collection": "Museum Folkwang, Essen, Germany",
  "date": "1867"
}
```



```
[
  - {
    id: 1,
    item: "Lise with a Parasol",
    artist: "Pierre Auguste Renoir",
    collection: "Museum Folkwang, Essen, Germany",
    date: "1867"
  },
  - {
    id: 2,
    item: "The Theatre Box",
    artist: "Pierre Auguste Renoir",
    collection: "Courtauld Gallery, London, England",
    date: "1874"
  },
  - {
    id: 3,
    item: "Dance in the City",
    artist: "Pierre Auguste Renoir",
    collection: "Musée d'Orsay, Paris, France",
    date: "1883"
  },
  - {
    id: 4,
    item: "Dance in the Country",
    artist: "Pierre Auguste Renoir",
    collection: "Musée d'Orsay, Paris, France",
    date: "1883"
  }
]
```

测试本地端API

- 指定搜寻

网址列输入 <http://localhost:3000/objects?item=Lise%20with%20a%20Parasol>

```
[  
  - {  
    id: 1,  
    item: "Lise with a Parasol",  
    artist: "Pierre Auguste Renoir",  
    collection: "Museum Folkwang, Essen, Germany",  
    date: "1867"  
  }  
]
```

知识检查

1. 如果 API 是水槽，下列哪项表述是正确的？

- ☐ 数据是水龙头。
- ☐ 数据是排水管。
- ☐ 数据在管道中。

2. API 表示：

- ☐ 应用程序编程智能
- ☐ 应用程序编程接口
- ☐ 自动项目接口
- ☐ 精彩编程知识

3. 必须了解应用程序的整个体系结构才能使用其 API。

- ☐ True
- ☐ 错误

探访纽约大都会博物馆API

• 列出各个部门

```
▼ {  
  ▼ "departments": [  
    ▼ {  
      "departmentId": 1,  
      "displayName": "American Decorative Arts"  
    },  
    ▼ {  
      "departmentId": 3,  
      "displayName": "Ancient Near Eastern Art"  
    },  
    ▼ {  
      "departmentId": 4,  
      "displayName": "Arms and Armor"  
    },  
    ▼ {  
      "departmentId": 5,  
      "displayName": "Arts of Africa, Oceania, and the Americas"  
    },  
    ▼ {
```

<https://collectionapi.metmuseum.org/public/collection/v1/departments>

过滤搜寻

- 列出departmentId为4而且是embossed silver的

```
▼ {  
  "total": 29,  
  ► "objectIDs": [ ... ] // 29 items  
}
```

```
▼ {  
  "total": 29,  
  ▼ "objectIDs": [  
    626019,  
    35690,  
    788174,  
    755339,  
    22895,  
    26799,  
    676819,  
    22740,  
    788199,  
    24959,  
    26433,  
    32102,  
    748484,  
  ]  
}
```


过滤搜寻

• 看看第一个物件的资料

```
{
  objectID: 626019,
  isHighlight: false,
  accessionNumber: "1988.65.1-.2; 1995.93a, b",
  accessionYear: "1988",
  isPublicDomain: true,
  primaryImage: "https://images.metmuseum.org/CRDImages/aa/original/DT5896.jpg",
  primaryImageSmall: "https://images.metmuseum.org/CRDImages/aa/web-large/DT5896.jpg",
  - additionalImages: [
    "https://images.metmuseum.org/CRDImages/aa/original/sfeah1995-93abCRs1.JPG",
    "https://images.metmuseum.org/CRDImages/aa/original/DT5897.jpg",
    "https://images.metmuseum.org/CRDImages/aa/original/sfeah1995-93abCRs1d1.JPG",
    "https://images.metmuseum.org/CRDImages/aa/original/sfeah1995-93abCRs1d2.JPG",
    "https://images.metmuseum.org/CRDImages/aa/original/sfeah1995-93abCRs2.JPG"
  ],
  - constituents: [
    - {
      constituentID: 11207,
      role: "Maker",
      name: "Helmet includes original paper label of Hallé",
      constituentULAN_URL: "",
      constituentWikidata_URL: "",
      gender: ""
    }
  ]
}
```



<https://collectionapi.metmuseum.org/public/collection/v1/objects/626019>

探访 Cooper Hewitt API



WELCOME TO OUR COLLECTION!

Explore over 30 centuries of design online, from ancient Roman marble to Pre-Columbian textiles, Renaissance drawings, contemporary 3D-printed chairs, and digital code. Please note that cataloging a collection of over 215,000 objects is a work in progress. You may come across records with very little information, factual errors, or harmful language. We appreciate your help in addressing these concerns and invite your [feedback](#).

SEARCH

☐ Has Images

[Advanced Search](#)

EXAMPLE SEARCHES: [Chair](#) [Poster](#) [Fork](#) [Sidewall](#) [Matchsafe](#) [Sampler](#)

<https://collection.cooperhewitt.org/>

探访 Cooper Hewitt API

- 注册帐号

PLEASE VERIFY YOUR AGE

Are you 13 years or older?

NO

YES

<https://you.cooperhewitt.org/signup/>

探访 Cooper Hewitt API

- 填写基本资料

Email Address

First Name

Last Name

Please choose a username

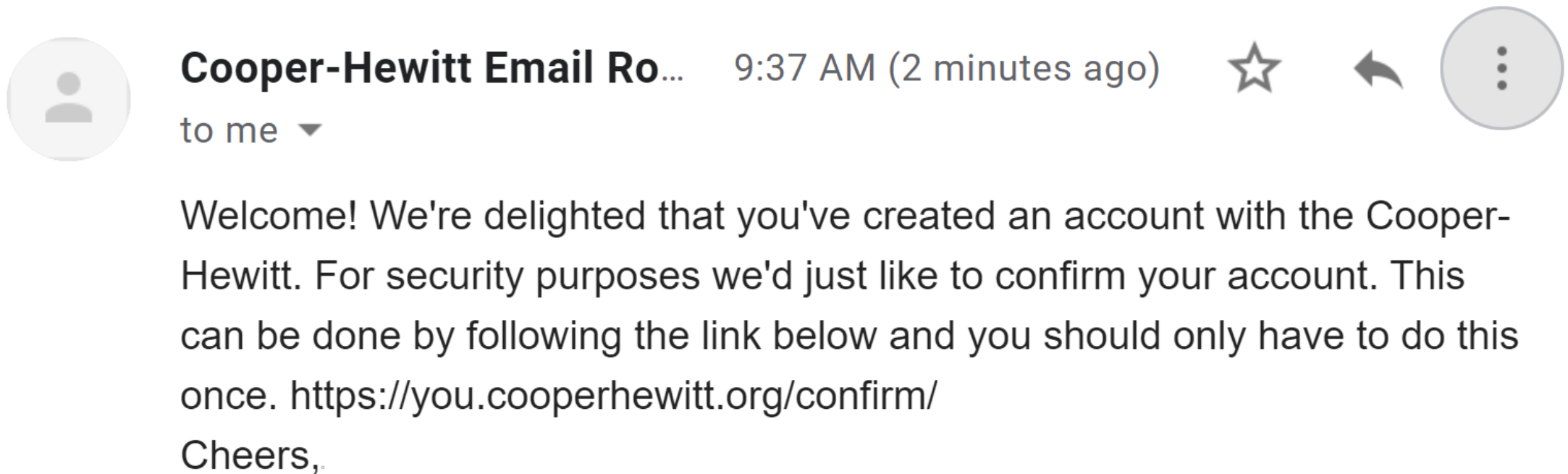
Please choose a password

要有大写字母、小写字母、符号

<https://you.cooperhewitt.org/signup/>

探访 Cooper Hewitt API

- 收取确认信，进入该连结



Okay, great! Your account has been confirmed and you are all set to go.

建立 API Key

CREATE A NEW API KEY

Name	<input type="text" value="Visit the Museum"/>
Description	<div><div>Visit the Museum</div></div>
Callback URL	<input type="text" value="Where to send users who want to auth your application"/>

REGISTER

<https://collection.cooperhewitt.org/api/keys/register/>

建立 API Key

CREATE A NEW API KEY

Name	Visit the Museum
Description	Visit the Museum
Callback URL	—
Terms of Service	<p>This Application Programming Service (API) is provided as-is and you agree to play nicely and not abuse it and that we, the API service provider, reserve the right to change things at our discretion with or without notice. This includes disabling access to the API if your applications starts misbehaving.</p> <p>Basically: Play nicely and don't be creepy.</p>
I agree!	<input checked="" type="checkbox"/>

MAKE IT SO (PLEASE)

<https://collection.cooperhewitt.org/api/keys/register/>

在API Key中建立Authentication Token

VISIT THE MUSEUM

Hooray! Here is your new API key.

API Key	
Authentication Tokens	There are no authenticated users for this API key Create an access token for yourself using this API key
Created	
Title	Visit the Museum
Description	Visit the Museum

在API Key中建立Authentication Token

REGISTER A PERSONAL TOKEN

Create a new authentication token for your [Visit the Museum API key](#)?

Permissions

read



Make this token valid

until I revoke it



Yup. I'm sure I want to do this!



CREATE

在API Key中建立Authentication Token

REGISTER A PERSONAL TOKEN

Hooray! A new authentication token has been created for you on behalf the Visit the Museum application.

Access Token

Permissions

read

测试API

https://api.collection.cooperhewitt.org/rest/?method=cooperhewitt.periods.getList&access_token=<your-token>&page=1&per_page=100

```
▼ {  
  ▼ "periods": [  
    ▼ {  
      "id": "35417101",  
      "url": "https://collection.cooperhewitt.org/periods/35417101/",  
      "name": "Rococo"  
    },  
    ▼ {  
      "id": "35417175",  
      "url": "https://collection.cooperhewitt.org/periods/35417175/",  
      "name": "Hudson River School"  
    },  
    ▼ {  
      "id": "35417089",  
      "url": "https://collection.cooperhewitt.org/periods/35417089/",  
      "name": "Neoclassical"  
    },  
    ▼ {  
      "id": "35435409",  
      "url": "https://collection.cooperhewitt.org/periods/35435409/",  
      "name": "American Modern"  
    },  
  ],  
}
```

查看特定时期的收藏 – 巴洛克

```
▼ {  
  "id": "35417081",  
  "url": "https://collection.cooperhewitt.org/periods/35417081/",  
  "name": "Baroque"  
},
```



BAROQUE



We have 166 objects associated with this period
and this is page 1 of 5

<https://collection.cooperhewitt.org/periods/35417081/>

回应代码的意义

- 如果没有AccessToken，直接呼叫

https://api.collection.cooperhewitt.org/rest/?method=cooperhewitt.periods.getList&access_token=<your-token>&page=1&per_page=100

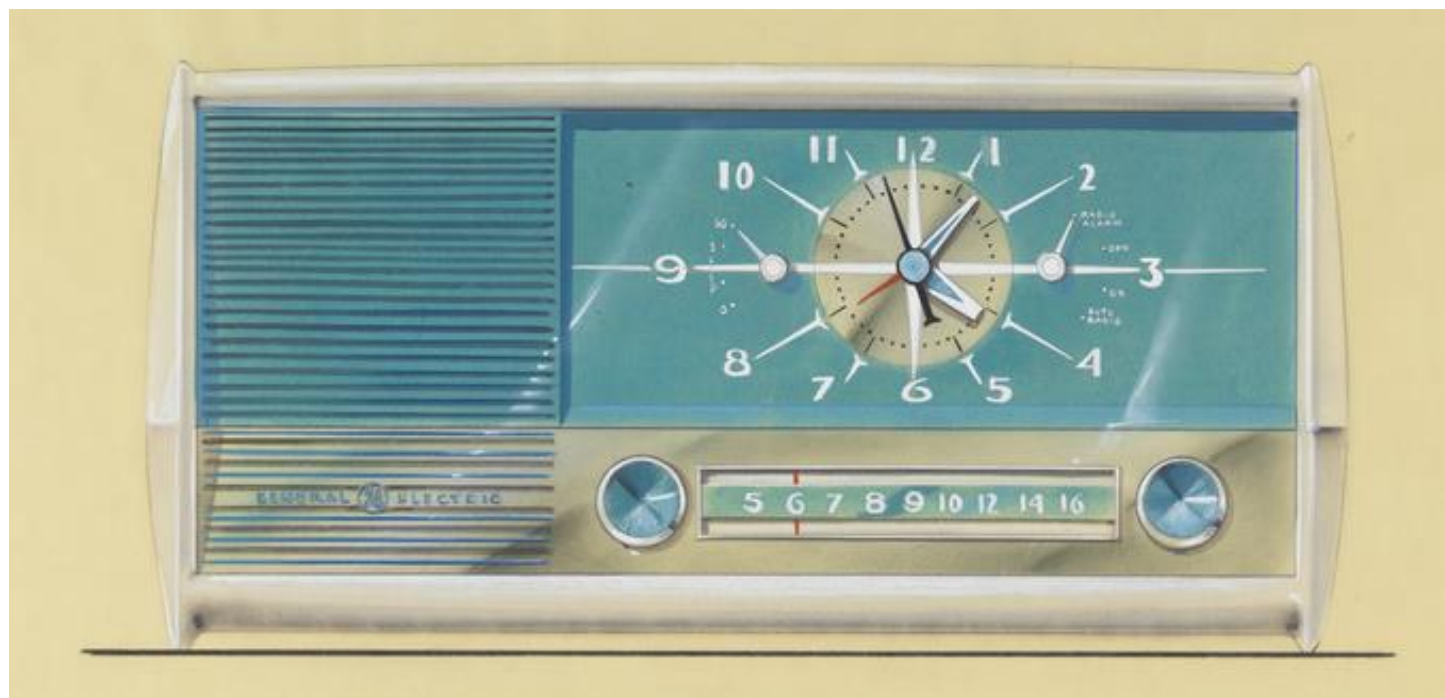
```
{  
  - error: {  
    code: 400,  
    error: "Invalid access token",  
    message: "Invalid access token"  
  },  
  stat: "error",  
  event_publishing_state: "ok"  
}
```

回应代码的意义

代码	原文	意义	可能原因
200	OK. The request was successful.	正常取得回应	
204	No Content.	没有内容	该物件原本就没有这项属性
301	Moved Permanently.	内容已换位置	API资料有变动
400	Bad Request.	存取错误	参数错误/API语法错误/数值超出范围
401	Unauthorized.	授权失败	API Key / Access Token 错误
403	Forbidden.	拒绝存取	存取了没有开放的资料夹位置
404	Not Found.	找不到该资源	存取了不存在的页面/资源
500	Internal Server Error.	内部伺服器错误	伺服器异常/关机/维护中

API存取练习

- 在Cooper Hewitt中
 - 搜寻 clock radio
 - 并且只要回传有图片的
 - 每页100个
 - 显示第1页



API存取练习

- 在Cooper Hewitt中
 - 搜寻 clock radio
 - 并且只要回传有图片的
 - 每页100个
 - 显示第1页

`https://api.collection.cooperhewitt.org/rest/?method=cooper
hewitt.search.collection&access_token=<your access
token>&query=clock%20radio&has_images=true&page=1&pe
r_page=100`

API存取练习

```
{  
  + objects: [ ... ],  
  total: 504,  
  page: 1,  
  per_page: 100,  
  pages: 6,  
  stat: "ok",  
  event_publishing_state: "ok"  
}
```

```
{  
  - objects: [  
    - {  
      id: "18639683",  
      tms:id: "194705",  
      accession_number: "1992-181-1",  
      title: "Drawing, Design for a Clock Radio, 1957",  
      title_raw: "Design for a Clock Radio",  
      url: "https://collection.cooperhewitt.org/objects/18639683/",  
      has_no_known_copyright: null,  
      department_id: "35347493",  
      period_id: null,  
      media_id: "35519991",  
      type_id: "35237093",  
      date: "1957",  
      year_start: 1957,  
      year_end: 1957,  
      year_acquired: "1992",  
      decade: "1950",  
      woe:country_id: "23424977",  
      medium: "blue, black pastel, brush and watercolor, gouache, graphite on vellum",  
      markings: "Designer's stamp in black ink, lower right: Richard Arbib Company, Inc. / [Studio no.] GE751/34SK / [Client no.] / [Designer] Donald Henry",  
      signed: "Signed in brush and white gouache, lower right: Arbib '57.",  
      inscribed: null,  
      provenance: "Richard H. Arbib; 1992: acquired by Museum",  
      dimensions: "H x W: 45.1 x 60.3 cm (17 3/4 x 23 3/4 in.)",  
    }  
  ]  
}
```

[+ - View source](#)

整合练习：在Node.js中存取API

- 在档案总管中新建资料夹node_access_api
- 打开VS Code，档案 -> 开启资料夹
- 新建index.js档案

index.js

```
const
  axios = require('axios'),
  config = require('config');

const COOPER_HEWITT_ACCESS_TOKEN = config.get('CooperHewittAccessToken');

var axios_config = {
  method: "get",
  url: "https://api.collection.cooperhewitt.org/rest/",
  headers: {},
  params: {
    method: "cooperhewitt.search.objects",
    access_token: COOPER_HEWITT_ACCESS_TOKEN,
    query: "clock radio",
    page: 1,
    per_page: 100
  }
};

axios(axios_config)
  .then(function(response){
    console.log(JSON.stringify(response.data));
  })
  .catch(function(error){
    console.log(error);
  });
```

设定config

- 新建config资料夹，在里面新增default.json档案
- 后面填上自己的Access Token

```
{  
    "CooperHewittAccessToken": "Your Access Token"  
}
```

Node专案初始化

- 检视 -> 终端

npm init

一直按Enter，建立package.json

- 修改package.json

```
"scripts": {  
  "test": "echo \"Error: no test specified\" && exit 1",  
  "start": "node index.js",  
  "debug": "node --inspect index.js"  
},
```

安装所需套件，启动侦错模式

- 检视 -> 终端
npm install axios
npm install config
- 点击左方「执行与侦错」
 - 建立Launch.json档案
 - 选择Node.js
 - 左上方下拉选单->新增组态...
 - Node.js: 透过 NPM启动
 - 左上方下拉选单->Launch via NPM
 - 按下「开始侦错」

```
"configurations": [  
  {} Node.js: Yeoman generator  
  {} Node.js: Yeoman 產生器  
  {} Node.js: 啟動程式  
  {} Node.js: 透過 NPM 啟動
```

 Launch via NP ▾

确认是否取得回传结果

• VS Code下方侦错主控台

```
> node --inspect index.js
```

```
{"objects":[{"id":"18639683","tms:id":"194705","accession_number":"1992-181-1","title":"Drawing, Design for a Clock Radio, 1957","title_raw":"Design for a Clock Radio","url":"https://collection.cooperhewitt.org/objects/18639683/","has_no_known_copyright":null,"department_id":"35347493","period_id":null,"media_id":"35519991","type_id":"35237093","date":"1957","year_start":1957,"year_end":1957,"year_acquired":"1992","decade":"1950","woe:country_id":"23424977","medium":"blue, black pastel, brush and watercolor, gouache, graphite on vellum","markings":"Designer's stamp in black ink, lower right: Richard Arbib Company, Inc. / [Studio no.] GE75 1/34SK / [Client no.] / [Designer] Donald Henry","signed":"Signed in brush and white gouache, lower right: Arbib '57.","inscribed":null,"provenance":"Richard H. Arbib; 1992: acquired by Museum","dimensions":"H x W: 45.1 x 60.3 cm (17 3/4 x 23 3/4 in.)","dimensions_raw":{"height":["45.10","centimeters"],"width":["60.30","centimeters"]},"creditline":"Museum purchase through gift of Mrs. Griffith Bailey Coale and from Eleanor G. Hewitt Fund","description":"Rectangular clock radio on yellowed vellum background and base line with white case, blue-green and silverish metal face. Clock and radio controls on right two-thirds of case with speaker on left third. General Electric and logo on lower left of speaker section.","justification":null,"gallery_text":"Arbib, who began his career styling cars for General Motors, made designs for clock radios that apply the flamboyant features of 1950s automobiles."}]}
```

使用PowerShell测试API

- 打开命令提示字元，输入pwsh
- 输入以下内容

Invoke-RestMethod

'https://api.collection.cooperhewitt.org/rest/?method=cooperhewitt.search.objects
&query=clock%20radio&page=1&per_page=100&access_token=yourtoken' -
Method 'GET' -Headers \$headers -Body \$body | ConvertTo-Json

- 确认是否获得回传结果

```
1,  
  "total": 627,  
  "page": 1,  
  "per_page": 100,  
  "pages": 7,  
  "stat": "ok",  
  "event_publishing_state": "ok"  
}
```

练习：经由API写入资料

```
[
  {
    "id": 1,
    "item": "Lise with a Parasol",
    "artist": "Pierre Auguste Renoir",
    "collection": "Museum Folkwang, Essen, Germany",
    "date": "1867"
  },
  {
    "id": 2,
    "item": "The Theatre Box",
    "artist": "Pierre Auguste Renoir",
    "collection": "Courtauld Gallery, London, England",
    "date": "1874"
  },
  {
    "id": 3,
    "item": "Dance in the City",
    "artist": "Pierre Auguste Renoir",
    "collection": "Musée d'Orsay, Paris, France",
    "date": "1883"
  },
  {
    "id": 4,
    "item": "Dance in the Country",
    "artist": "Pierre Auguste Renoir",
    "collection": "Musée d'Orsay, Paris, France",
    "date": "1883"
  },
  {
    "id": 5,
    "item": "The Fiancés",
    "artist": "Pierre Auguste Renoir",
    "collection": "Wallraf-Richartz Museum, Cologne, Germany",
    "date": "1868"
  }
]
```

确认本地端API伺服器有开启

- VS Code 档案 -> 开新视窗
- 档案 -> 开启资料夹，找到本地端API测试练习资料
- 检视 -> 终端

`json-server --watch db.json`

- 打开浏览器

网址列输入 <http://localhost:3000/objects>

```
localhost:3000/objects
[
  - {
    id: 1,
    item: "Lise with a Parasol",
    artist: "Pierre Auguste Renoir",
    collection: "Museum Folkwang, Essen, Germany",
    date: "1867"
  },
  - {
    id: 2,
    item: "The Theatre Box",
    artist: "Pierre Auguste Renoir",
    collection: "Courtauld Gallery, London, England",
    date: "1874"
  },
  - {
    id: 3,
    item: "Dance in the City",
    artist: "Pierre Auguste Renoir",
    collection: "Musée d'Orsay, Paris, France",
    date: "1883"
  },
  - {
    id: 4,
    item: "Dance in the Country",
    artist: "Pierre Auguste Renoir",
    collection: "Musée d'Orsay, Paris, France",
    date: "1883"
  }
]
```

修改存取博物馆API的index.js如下


```
const axios = require('axios');

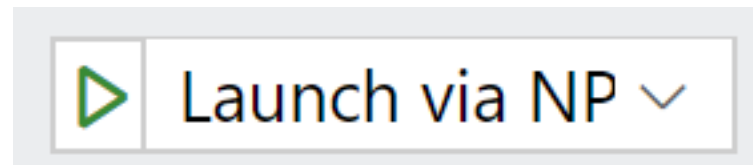
let new_data = JSON.stringify({
  id:5,
  item:"The Fiancés",
  artist:"Pierre Auguste Renoir",
  collection:"Wallraf-Richartz Museum, Cologne, Germany",
  date:"1868"
});

var axios_write_data = {
  method:"post",
  url:"http://localhost:3000/objects",
  headers:{
    "content-type":"application/json"
  },
  data:new_data
};

axios(axios_write_data)
  .then(function(response){
    console.log(JSON.stringify(response.data));
  })
  .catch(function(error){
    console.log(error);
  });
```

启动侦错

- 点击左方「执行与侦错」
- 左上方下拉选单->Launch via NPM
- 按下「开始侦错」
- 打开浏览器



网址列输入 <http://localhost:3000/objects>

确认是否有新增资料

```
- {  
  id: 5,  
  item: "The Fiancés",  
  artist: "Pierre Auguste Renoir",  
  collection: "Wallraf-Richartz Museum, Cologne, Germany",  
  date: "1868"  
}
```

]

知识检查

1. 所有 API 都需要密钥才能访问。

- ☐ True
- ☐ False

2. OAuth 使用访问令牌来执行以下任务：

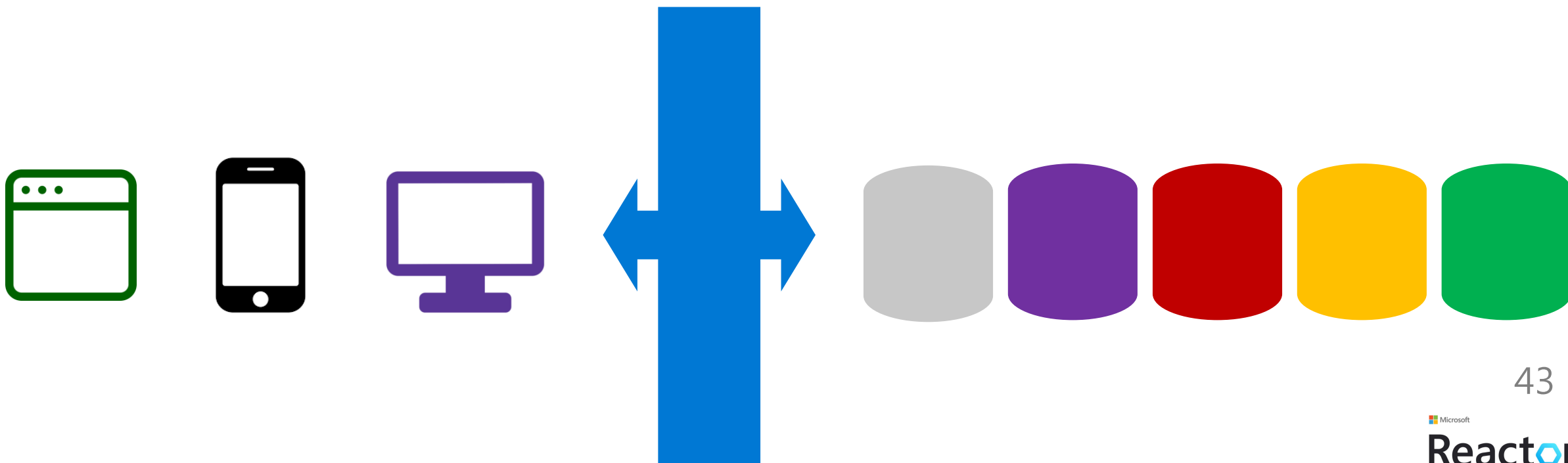
- ☐ 获取授权代码
- ☐ 确保用户已登录
- ☐ 确保安全性

3. API 可用于以下用途：

- ☐ 电子商务应用程序
- ☐ 文化组织
- ☐ 付款事务
- ☐ 以上都是

Summary

- 了解取用规则、权限，测试使用
- 查询、新增、删除、更新资料
- JavaScript / Python / PowerShell / 其他环境运用API





Reactor



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请记得填写课程回馈问卷 (Event ID : **XXXXXX**)
<https://aka.ms/Reactor/Survey>

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