Node.js 在後端程式的應用

報告者：洪子謙

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Node.js® is a JavaScript runtime built on Chrome's V8 JavaScript engine. Node.js uses an event-driven, non-blocking I/O model that makes it lightweight and efficient. Node.js' package ecosystem, npm, is the largest ecosystem of open source libraries in the world.

Important security releases, please update now!

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8.9.1 LTS
Recommended For Most Users

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9.2.0 Current
Latest Features

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2009年Ryan Dahl建立Node.js。
Node.js使用C++語言編寫。
以V8 JavaScript Engine作為直譯器。
建置一個可執行JavaScript的環境。
事件驅動、非阻塞I/O的特性
可作為web Server（JavaScript）。
擁有可觀的open source 的套件。


JS
REQUIRE·JS
npm
TS
BABEL
JS
A
REQUIRE·JS
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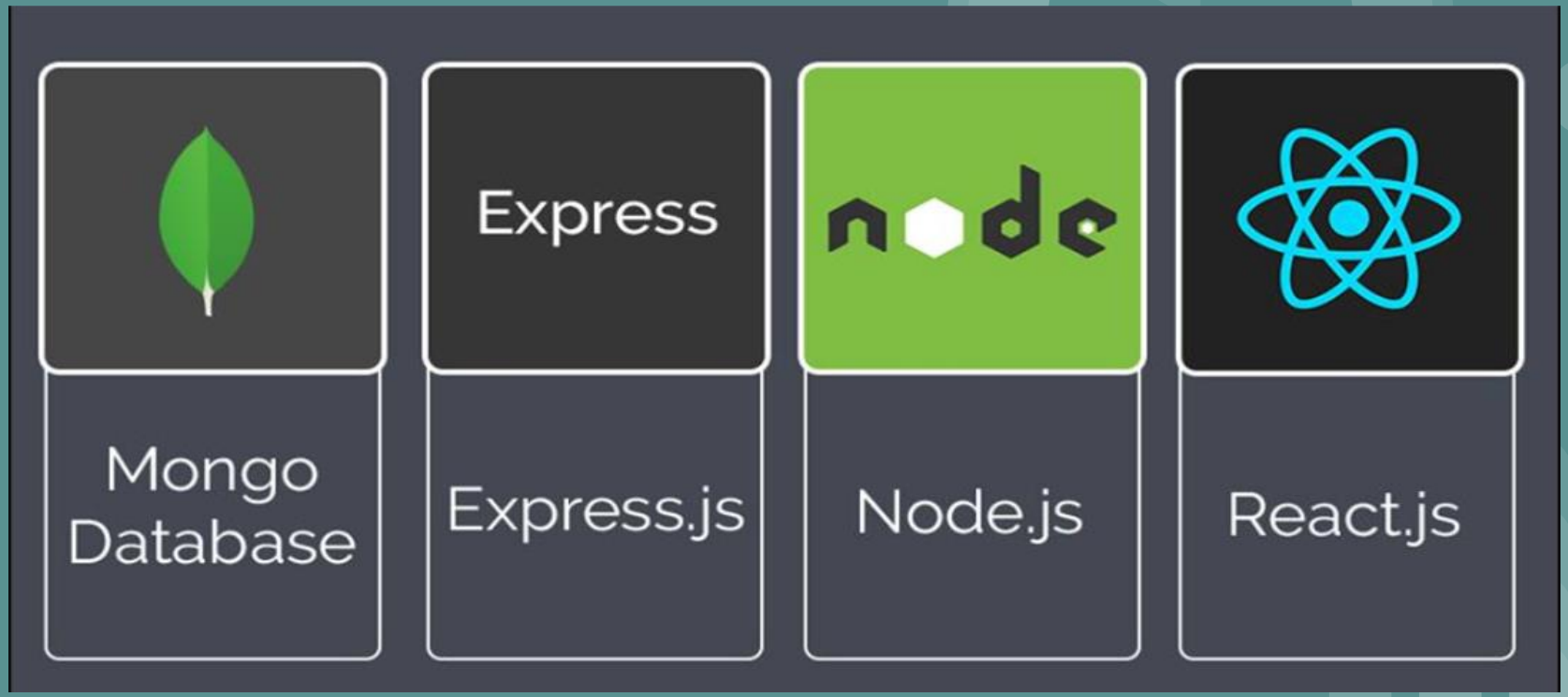
REQUIRE·JS

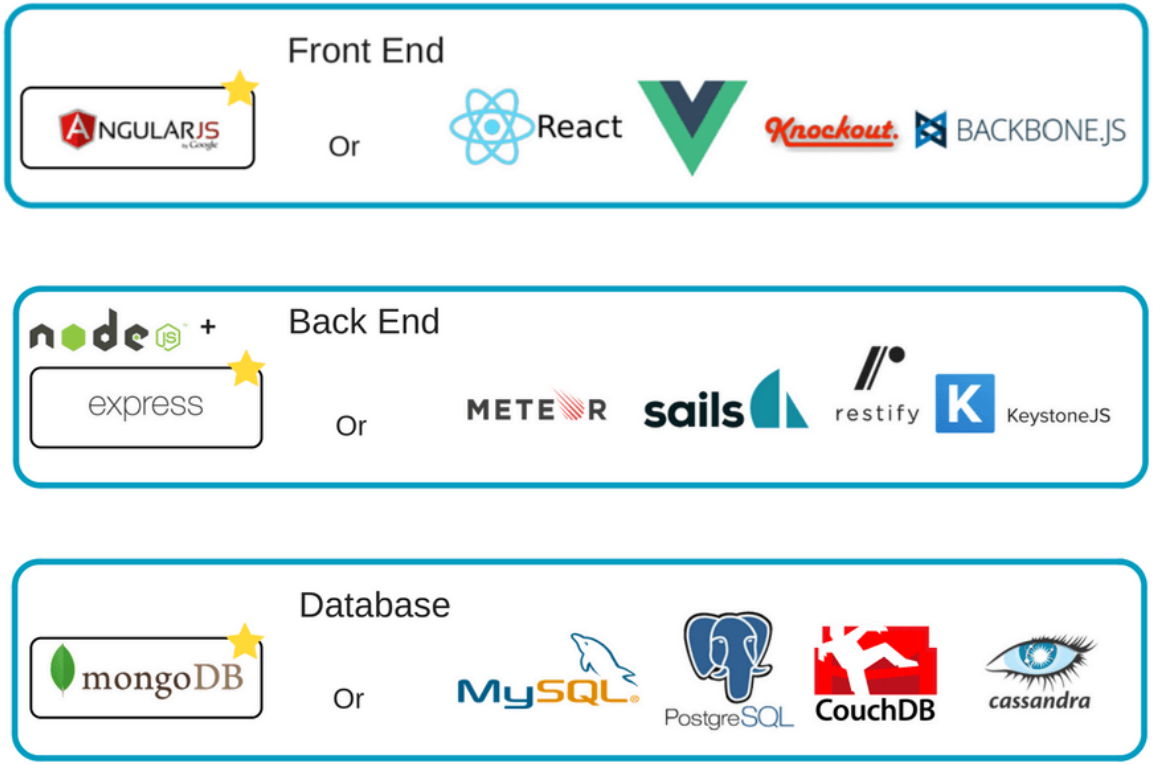
MEAN Stack


Express
Mongo DB
(database system)
Express
(back-end web framework)
Angular.js
(front-end framework)
Node.js
(back-end runtime environment)

MERN Stack



Full Stack JavaScript Tools and Technologies



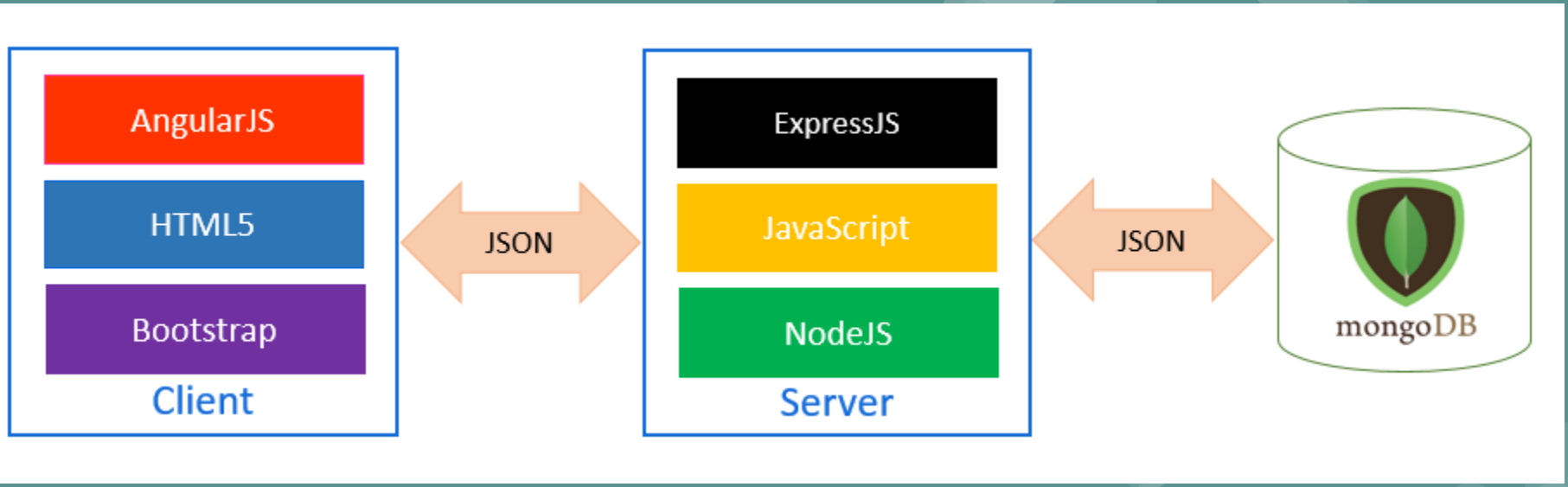

php


Laravel


MySQL


expressjs


MySQL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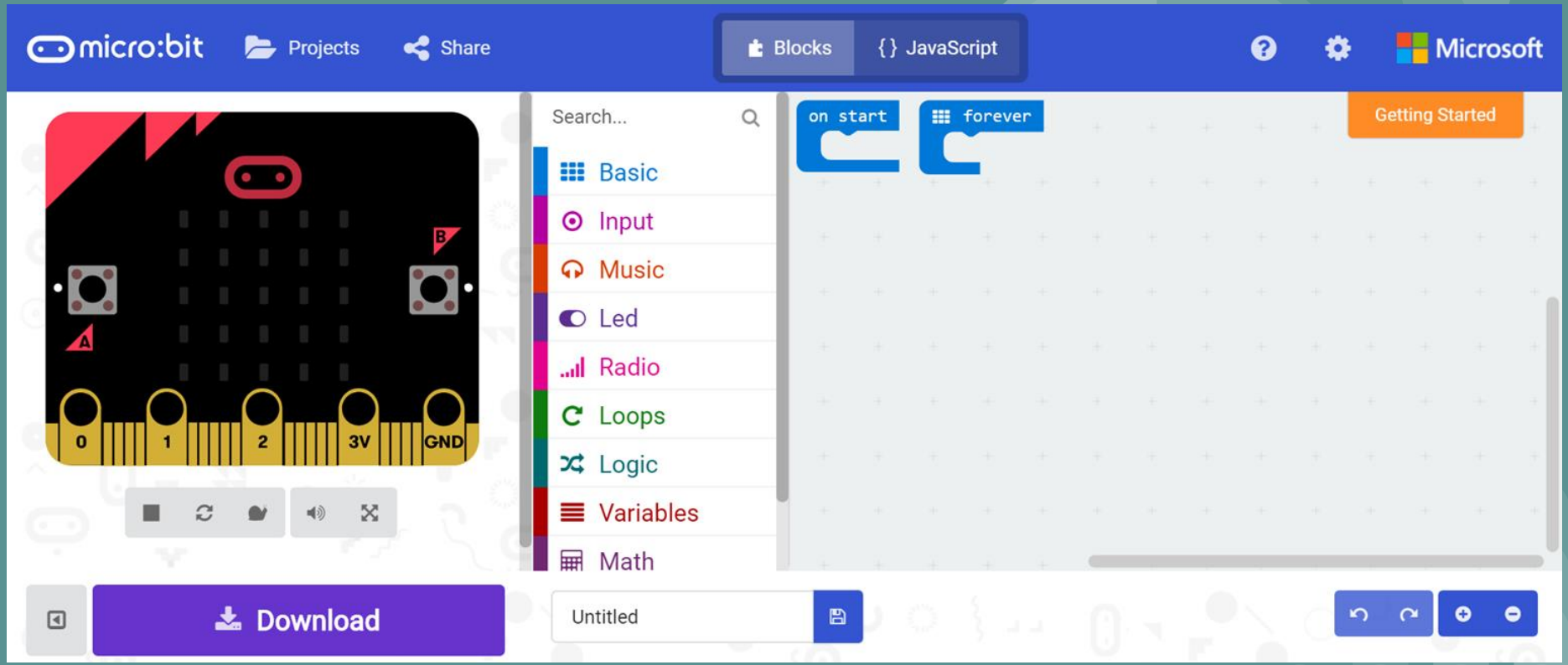
ExpressJS
JavaScript
NodeJS
Server
JSON
mongoDB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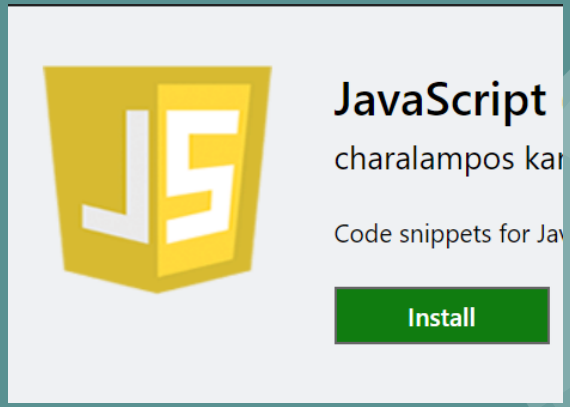
環境設定與安裝測試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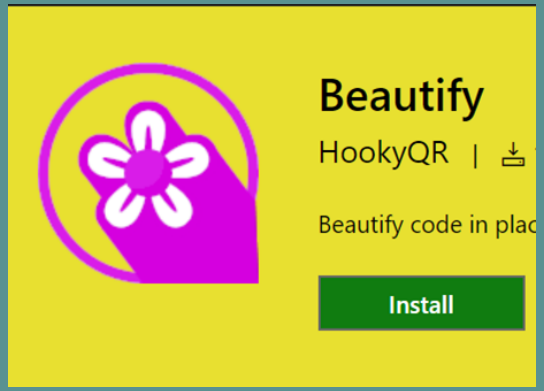
Install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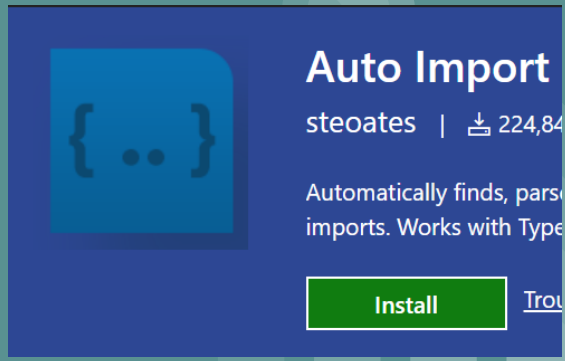
Path Intellisense
Christian Kohler | 159,3
Visual Studio Code plugin that auto
Installation
Launch VS Code Quick Open (⌘+P
ext install path-intellise


Auto Import
steoates | 224,84
Automatically finds, pars
imports. Works with Type
Install
Trou

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express

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moment public

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建立Node.js網頁伺服器

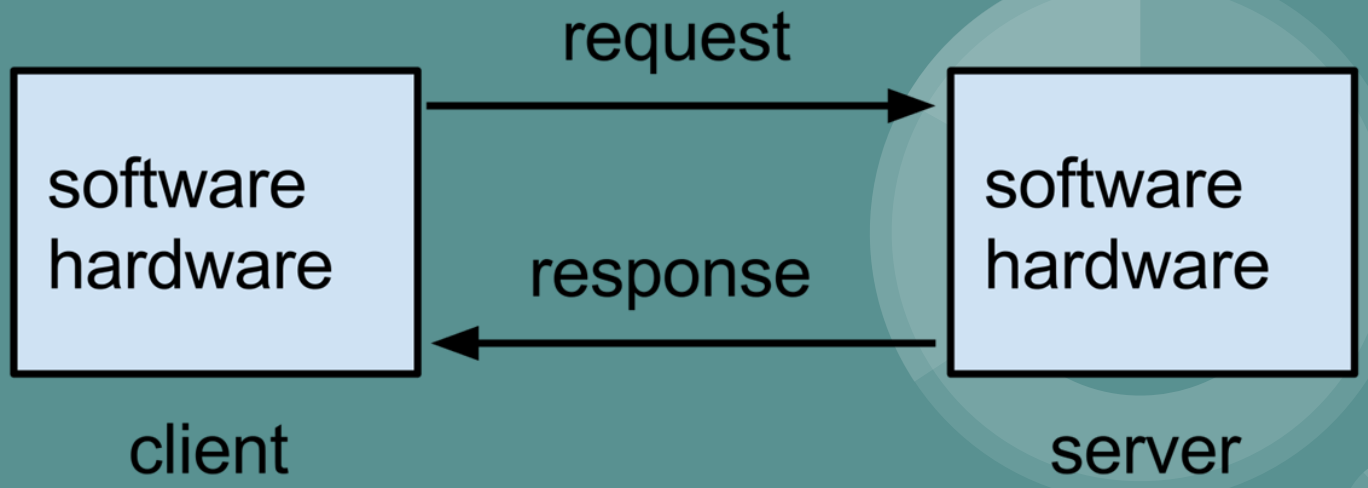
1.建立專案資料夾 mkdir node_server
2.切換至工作路徑 cd node_server
3.初始化專案 npm init or npm init -y
4.建立檔案server.js & coding & save
5.執行程式 node server.js

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

const hostname = '127.0.0.1';
const port = 3000;

const server = http.createServer((req, res) => {
  res.statusCode = 200;
  res.setHeader('Content-Type', 'text/plain');
  res.end('Hello World\n');
});

server.listen(port, hostname, () => {
  console.log(`Server running at http://${hostname}:${port}/`);
});
```



Client發出請求，稱之為 Request。
Server收到請求，根據請求處理後回應，稱之為Response。

使用nodemon套件


```
npm install -g nodemon
```

```
npm install --save-dev nodemon
```

Express Web Framework
建立網頁伺服器

1.建立專案資料夾 mkdir express_server
2.切換至工作路徑 cd express_server
3.初始化專案 npm init or npm init -y
4.npm install --save express
5.建立檔案server.js & coding & save
6.執行程式 node server

```
const express = require('express' 4.16.2 )
const app = express()

app.get('/', (req, res) => res.send('Hello World!'))

app.listen(3000, () => console.log('Example app listening on port 3000!'))
```

RESTful

Representational State Transfer，簡稱REST。

它是一種網路架構風格，他並不是一種標準。

將server端提供的內容，視為一項resource。

並呈現在瀏覽器URL上如http://localhost/user/5。

網址為一項資源，針對資源的操作，主要靠HTTP的request method

非RESTful的設計方式

POST /user/add?name=jack Create
GET /user/get?name=jack Read
POST /user/update?name=jack Update
GET /user/remove?name=jack Delete

早期程式設計者或許會設計成如下的URL

RESTful的設計方式

POST /user/jack	Create
GET /user/jack	Read
PUT /user/jack	Update
DELETE /user/jack	Delete

URL設計資源

http request method定義資源的操作

Name	Path	HTTP Verb	Purpose	ActiveRecord CRUD Methods	SQL
Index	/dogs	GET	List all dogs	Dog.all	SELECT * FROM dogs
Show	/dogs/:id	GET	Show information about one dog	Dog.find_by(name: "Boo") OR Dog.find(1)	SELECT * FROM dogs WHERE name = "Boo" OR SELECT * FROM dogs WHERE id = 1
New	/dogs/new	GET	Show new dog form		
Create	/dogs	POST	Create a new dog, then redirect	Dog.create(name: "Boo")	INSERT INTO dogs (name) VALUES ("Boo")
Edit	/dogs/:id/edit	GET	Show edit form for one dog		
Update	/dogs/:id	PATCH	Update one dog, then redirect	Dog.update(id, :age = 10)	UPDATE dogs SET (age = 10) WHERE id = 1
Destroy	/dogs/:id/delete	DELETE	Delete one dog, then redirect	Dog.destroy(id)	DELETE FROM dogs WHERE id = 1

RESTful Routes

A table of all 7 RESTful routes

Name	Path	HTTP Verb	Purpose
Index	/dogs	GET	List all dogs
New	/dogs/new	GET	Show new dog form
Create	/dogs	POST	Create a new dog, then redirect somewhere
Show	/dogs/:id	GET	Show info about one specific dog
Edit	/dogs/:id/edit	GET	Show edit form for one dog
Update	/dogs/:id	PUT	Update a particular dog, then redirect somewhere
Destroy	/dogs/:id	DELETE	Delete a particular dog, then redirect somewhere

Express提供Restful Web API

app.METHOD(PATH, HANDLER)

- app is an instance of express.
- METHOD is an HTTP request method, in lowercase.
- PATH is a path on the server.
- HANDLER is the function executed when the route is matched.

app.METHOD(PATH, HANDLER)

HANDLER(callback)

```
function(req,res) {
        //處理連線要求，並回應
browser
}
```

request -連線要求的資訊和方法
response -回應連線的資訊和方法

```
app.post('/api/todos', function (req, res)
    {
        處理程式碼
    });
```

```
addTodo(todo): Observable<any> {
    let url = this.backendBaseUrl + '/todos';
    let body = JSON.stringify(todo);
    console.log(body);
    return this.http.post(url, body, this.options)
        .map(res => res.json().data);
}
```

```
app.get('/api/todos', function (req, res)
    {
        處理程式碼
    });
```

```
getTodos(delay = 0): Observable<any> {
    return this.http
        .get(this.backendBaseUrl+'/todos')
        .delay(delay)
        .map(res => res.json().data);
}
```

```
app.get('/api/todos/:id', function (req, res)
    {
        處理程式碼
    });
```

```
getTodo(id): Observable<any> {
    let url = this.backendBaseUrl + '/todos/' + id;
    return this.http.get(url)
        .map(res => res.json().data);
}
```

```
app.put('/api/todos/:id', function (req, res)
    {
        處理程式碼
    });
```

```
updateTodo(todo): Observable<any> {
    let url = this.backendBaseUrl + '/todos/' + todo.id;
    console.log(url);
    let body = JSON.stringify(todo);
    return this.http.put(url, body, this.options)
        .map(res => res.json());
}
```

```
app.delete('/api/todos/:id', function (req, res)
    {
        處理程式碼
    });
```

```
deleteTodo(id): Observable<any> {
    let url = this.backendBaseUrl + '/todos/' + id;
    return this.http.delete(url, this.options)
        .map(res => res.json());
}
```

```
app.put('/api/todos/toggledone/:id', function (req, res)
    {
        處理程式碼
    });
```

```
toggleDone(id): Observable<any> {
    let url = this.backendBaseUrl + '/todos/toggleDone/' + id;
    return this.http.put(url, '', this.options)
                .map(res => res.json())
                .do(data => console.log(data));
}
```

todo-serveice.ts

```
//backendBaseUrl: string = environment.url + 'todos.php';
backendBaseUrl: string = 'http://localhost:3000/api';
headers                = new Headers({'Content-Type': 'application/json'});
options                = new RequestOptions({headers: this.headers/*, withCredentials:
```

安装mysql第三方套件

npm install --save express

node.js模組簡介

有三大類的模組：

Core Modules (原生模組)如http、path、fs

Local Modules (自建模組)如db.js、routes.js

Third Party Modules (第三方模組)如express、body-parser

引入模組

撰寫模組db.js

```
module.exports = dbconn
```

```
const dbconn = require('../model/db.js')
```

```
dbconn.query(sql, (err, rows) => ...)
```

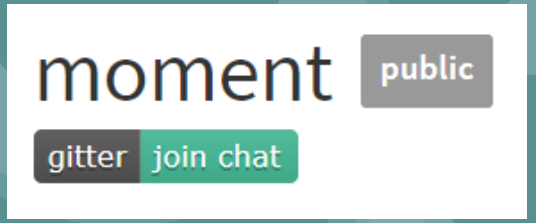
安裝body-parser第三方套件


```
npm install --save body-parser
```

安裝morgan第三方套件


```
npm install --save morgan
```

安裝moment第三方套件




```
npm install --save-dev cors
```

安裝cors第三方套件


```
npm install --save-dev cors
```

Route Parameters路由參數

Route parameters

Route parameters are named URL segments that are used to capture the valu
populated in the `req.params` object, with the name of the route parameter sp

```
Route path: /users/:userId/books/:bookId
Request URL: http://localhost:3000/users/34/books/8989
req.params: { "userId": "34", "bookId": "8989" }
```

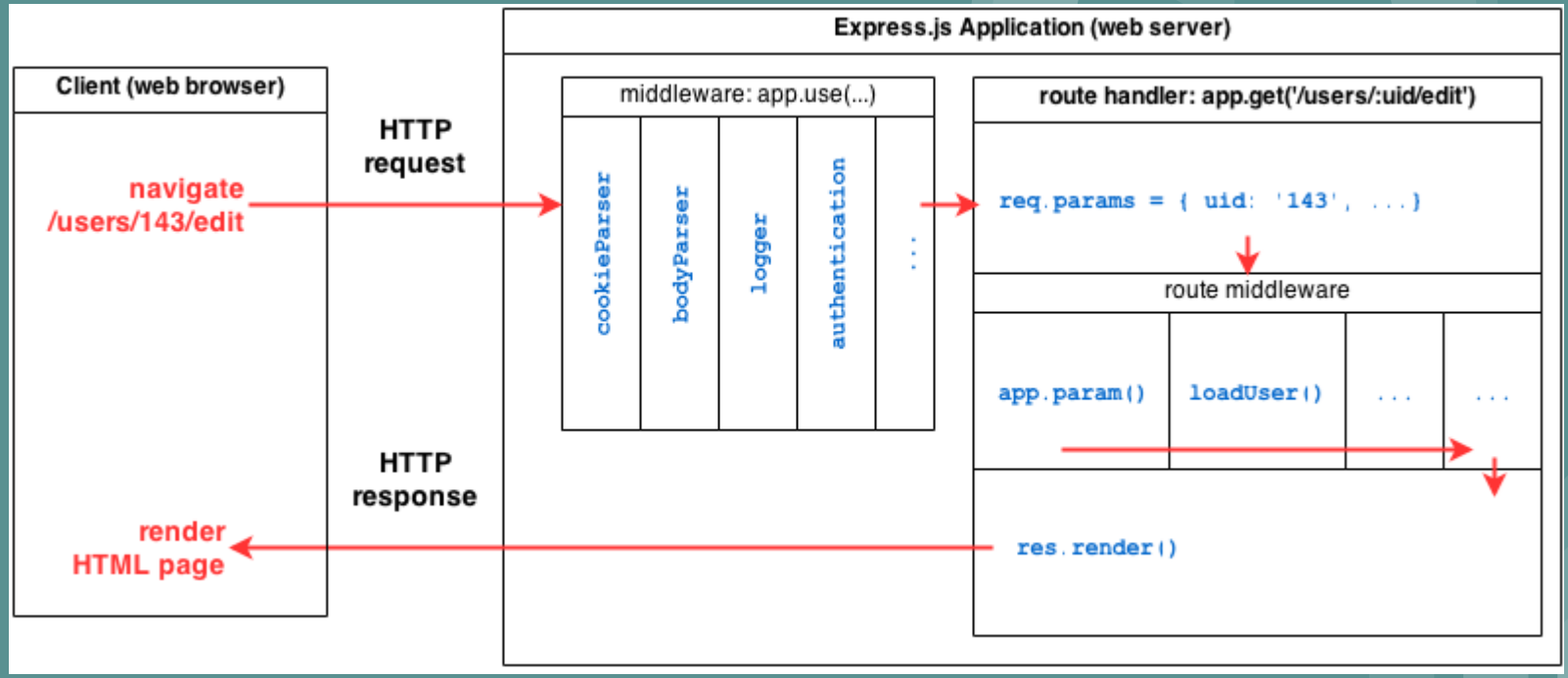
To define routes with route parameters, simply specify the route parameters

```
app.get('/users/:userId/books/:bookId', function (req, res) {
  res.send(req.params)
})
```

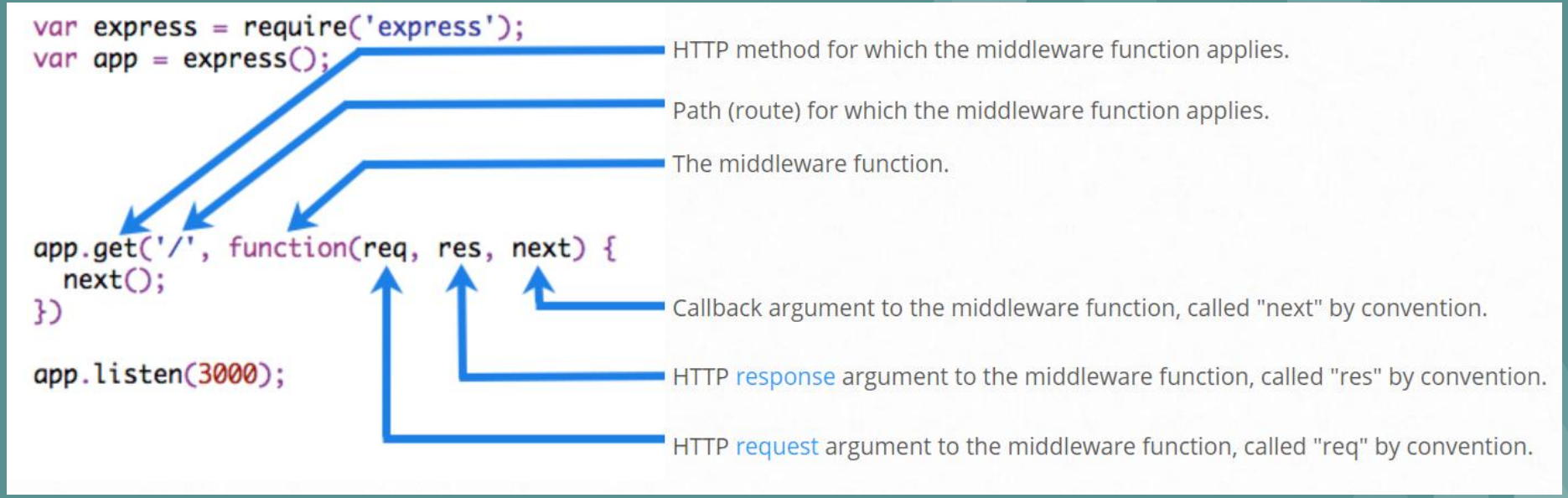
req.body方法來獲取表單資料

```
app.post('/news', function (req, res) {
 let data = {
   title : req.body.title,
   content:req.body.content
   }
   res.send(data);
});
```

middleware中介函式



exprees middleware寫法



exprees middleware

An Express application can use the following types of middleware:

- Application-level middleware
- Router-level middleware
- Error-handling middleware
- Built-in middleware
- Third-party middleware

Router-level middleware

```
app.use(express.static(path.join(__dirname, 'public')));
app.use(express.static(path.join(__dirname, 'dist')));
```

Built-in middleware

```
const api = equire('./routes');
 app.use('/api',api);
```

```
router.get('/todos', (req, res) => {
    let sql = 'SELECT id, title, content, done FROM todos ORDER BY id DESC';
    dbconn.query(sql, (err, rows) => {
• • • •       • • • •     • • • •
    });
});
```

Third-party middleware

```
app.use(bodyParser.json());
app.use(bodyParser.urlencoded({
extended: false
}));
```

Third-party middleware

```
app.use(logger('dev'));
app.use(cors());
```

```
SELECT id, title, content, done FROM todos ORDER BY id DESC
```

```
app.get('/api/todos', function (req, res) {
    let sql = 'SELECT id, title, content, done FROM todos ORDER BY id DESC';
    dbconn.query(sql, function (err, rows) {
        if (err) {
            console.log(err);
            res.send(err);
        }
            res.json({
            data: rows
          });

    });
});
```

取得 todo list

```
SELECT id, title, content, done FROM todos WHERE id = ?
```

```
app.get('/api/todos/:id', function (req, res) {
    let sql = `SELECT id, title, content, done FROM todos WHERE id = ?`;
    dbconn.query(sql, [req.params.id], function (err, row) {
        if (err) {
            console.log(err);
            res.send(err);
        }
        console.log(JSON.stringify(row[0]));
        res.json({
            data: row[0]
         });
    });

});
```

取得一筆 todo

```
INSERT INTO todos (title, content, created_at) VALUES
(:title, :content, :created_at)
```

```
app.post('/api/todos', function (req, res) {
    let data = {
        title: req.body.title,
        content: req.body.content,
        created_at: moment().format("YYYY-MM-DD HH-mm-ss")
    }
    let sql = "INSERT INTO todos SET ?";
    dbconn.query(sql, data, function (err, row) {
        if (err) {
            console.log(err);
            res.send(err);
        }
        res.json({
            data: row
          });
    });
});
```

新增 todo

```
UPDATE todos SET title=:title, content=:content, done=:done,
updated_at=:updated_at WHERE id=:id
```

```
app.put('/api/todos/:id', function (req, res) {
    let data = {
        title: req.body.title,
        content: req.body.content,
        done:true,
        updated_at: moment().format("YYYY-MM-DD HH-mm-ss")
    }
    let sql = "UPDATE todos SET ? WHERE id = ?";
    dbconn.query(sql, [data,req.params.id], function (err, row) {
        if (err) {
                        console.log(err);
                }
        res.json({
                        data: row
                });
        });
});
```

更新一筆 todo

```
Update todos SET done= NOT done, updated_at=:updatedAt WHERE id = :id
```

```
app.put('/api/todos/toggledone/:id', function (req, res) {
    let sql = `UPDATE todos SET done= NOT done,
updated_at="${moment().format("YYYY-MM-DD HH-mm-ss")}" WHERE id
=${req.params.id}`;
    dbconn.query(sql, function (err, row) {
        if (err) {
            console.log(err);
            res.send(err);
        }
        console.log(row);
        res.json({
            data: row
          });
    });
});
```

切換一筆 todo 的完成與否

app-routing.module.ts

```
const routes: Routes = [

 {path: 'home', component: HomeComponent},
 {path: 'todos', component: TodoListComponent},
 {path: 'todos/new', component: NewTodoComponent},
 {path: 'todos/:id/edit', component: EditTodoComponent},
...
```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localhost:3000/api/todos/


```
{
    "data": [
        {
            "id": 54,
            "title": "賴揆拍版 3個月加班不得超過138小時",
            "content": "賴清德中午主持行政立法協調會報，會後徐國勇轉述會中共識。其中，對於休息日出勤工資計算，取消「做1給4」、「做5給8」計算方式，改依勞工實際出勤的時間來計算。",
            "done": 1
        },
        {
            "id": 53,
            "title": "政院拍板一例一休修法方向 國民黨團擬提版本因應",
            "content": "對於一例一休修法，立法院國民黨團召開幹部會議研商相關對策，黨團副書記長蔣萬安會後轉述，黨中央與黨團基本上有共識，反對政院版鬆綁七休一、調高加班時數上限及縮短輪班間隔",
            "done": 0
        }
```


```
app.get('/api/todos',...
```

localhost:3000/api/todos/54


```
{
    "data":
        {
            "id": 54,
            "title": "賴揆拍版 3個月加班不得超過138小時",
            "content": "賴清德中午主持行政立法協調會報，會後徐國勇轉述會中共識。其中，對於休息日出勤工資計算，取消「做1給4」、「做5給8」計算方式，改依勞工實際出勤的時間來計算。",
            "done": 1
        }
```


```
app.get('/api/todos/:id',...
```

http://localhost:3000/api/todos/40


```
{
    "message": "刪除資料成功"
}
```


```
app.delete('/api/todos/:id',...
```

http://localhost:3000/api/todos/


```
{
    "message": "新增資料成功"
}
```


```
app.post('/api/todos',...
```

http://localhost:3000/api/todos/40


```
{
    "message": "修改資料成功"
}
```

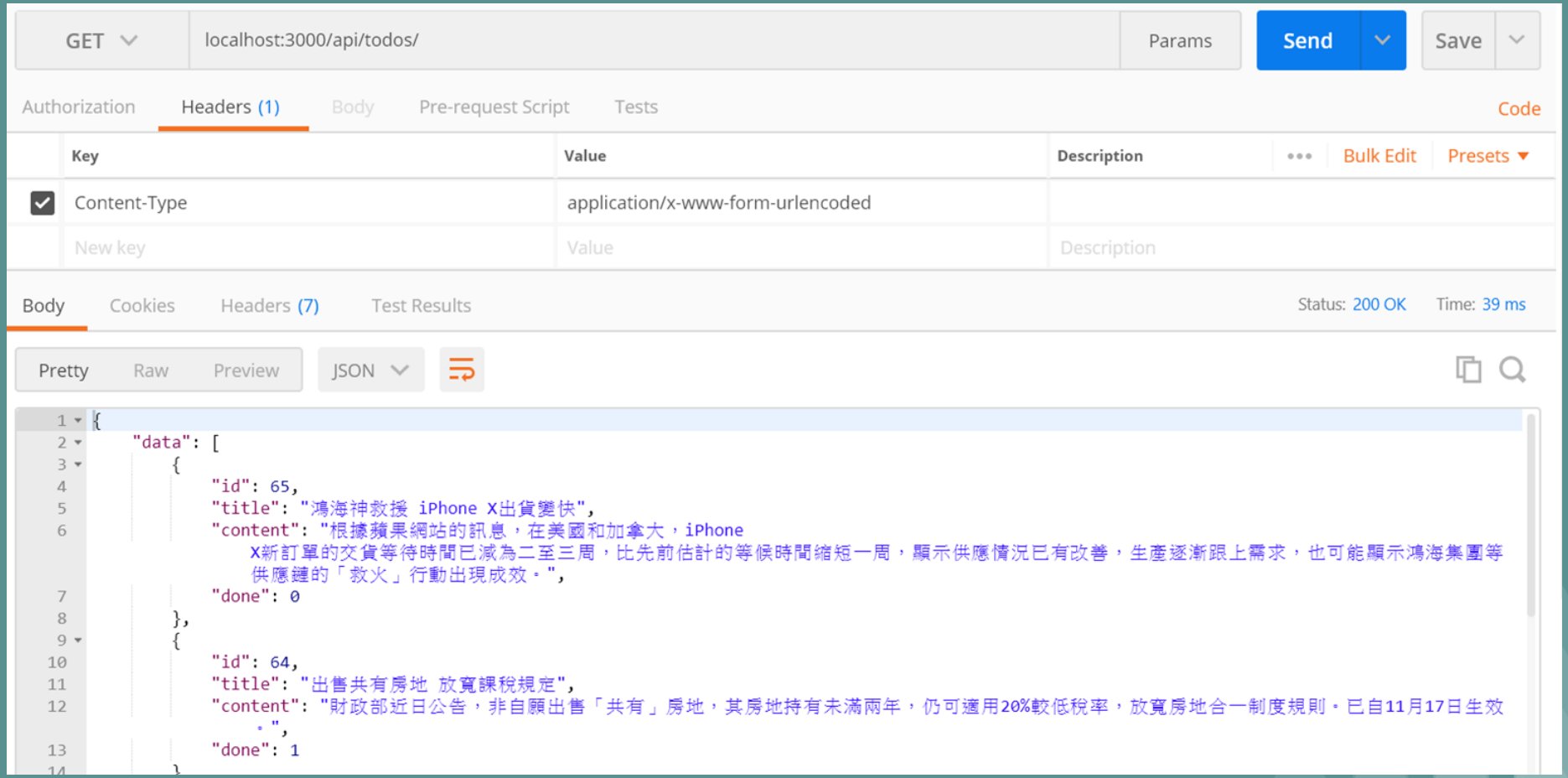

```
app.put('/api/todos/:id', …)
```

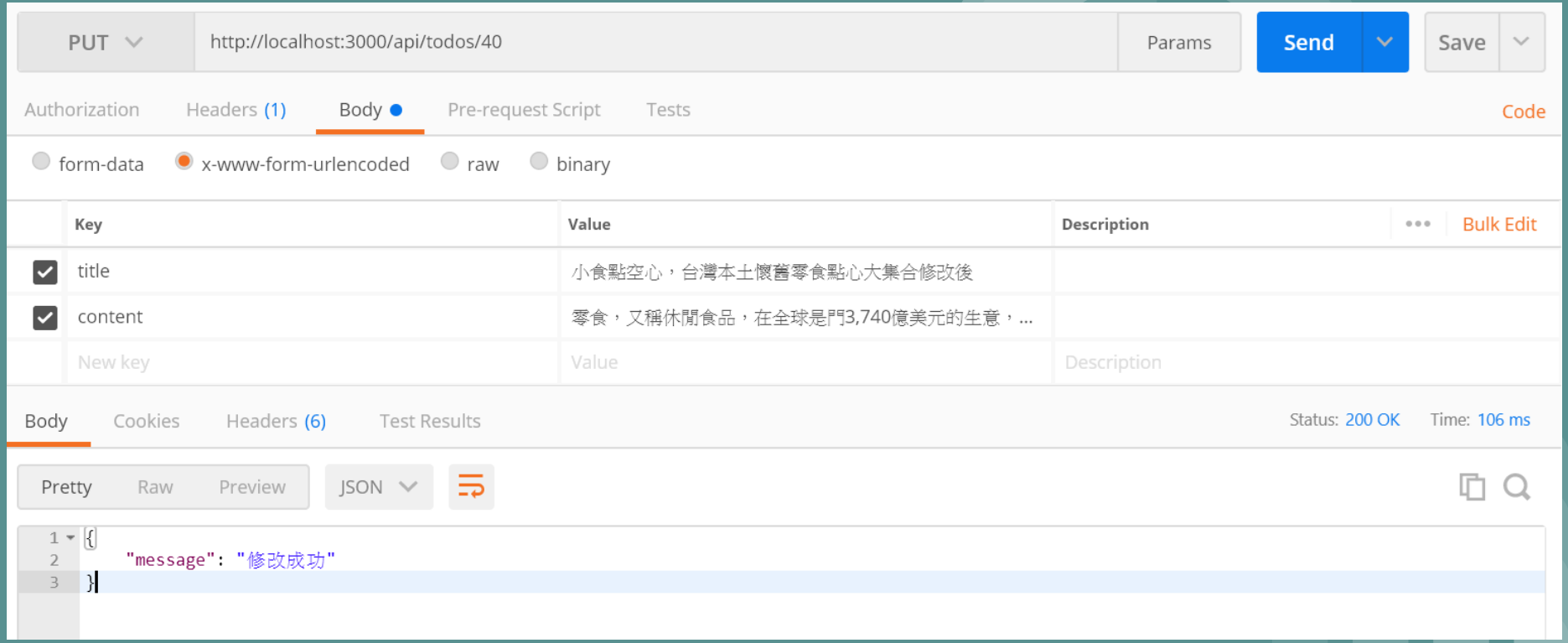
localhost:3000/api/todos/toggledone/40

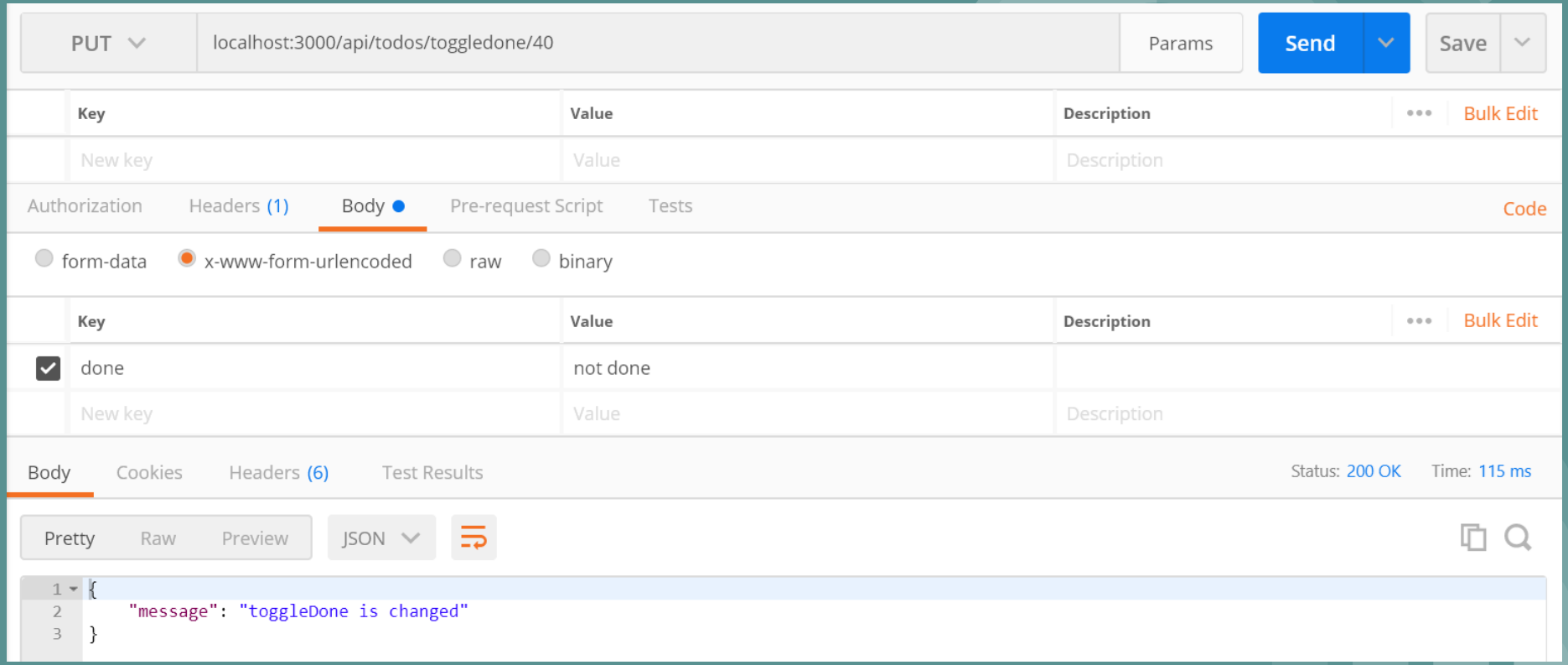

```
{
    "message": "toggleDone is changed"
}
```

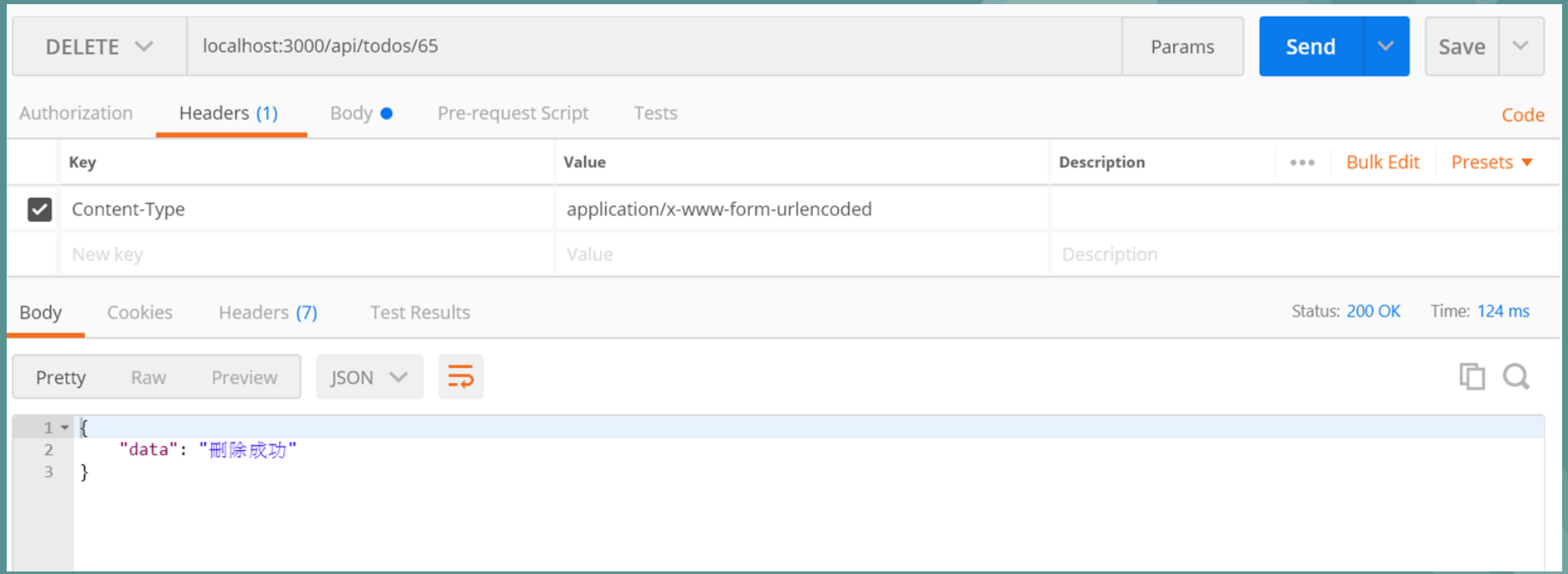

```
app.put('/api/todos/toggledone/:id',... )
```

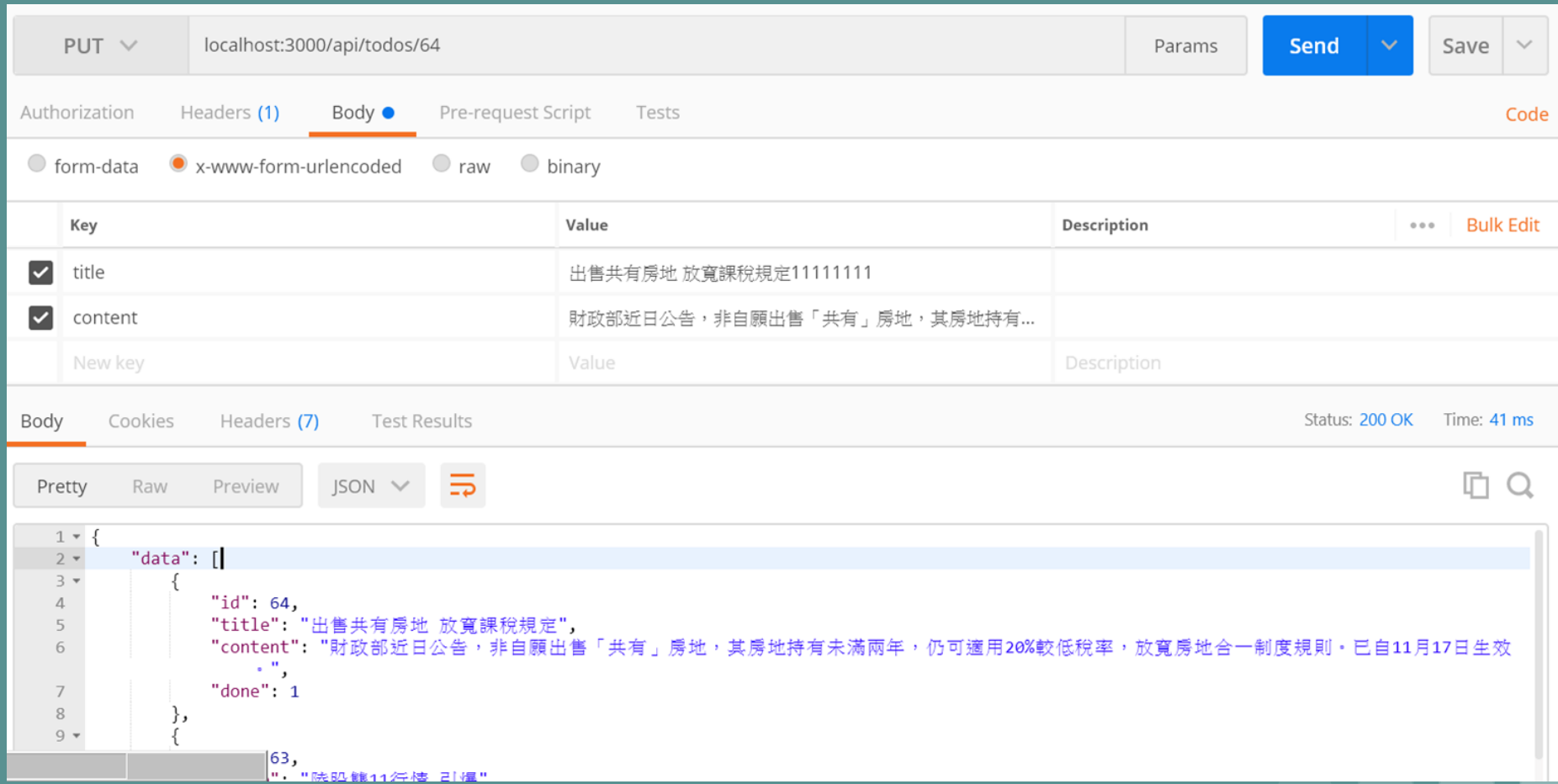

POST
localhost:3000/api/todos/
Params
Send
Save
Authorization
Headers (1)
Body
Pre-request Script
Tests
Code
form-data
x-www-form-urlencoded
raw
binary
Key
Value
Description
Bulk Edit
title
國門陸橋大火 清潔隊員被法辦
content
警方調查結果，排除人為縱火之嫌，已將負責管理的環...
New key
Value
Description


GET
localhost:3000/api/todos/
Params
Send
Save
Authorization
Headers (1)
Body
Pre-request Script
Tests
Code
Key
Value
Description
Bulk Edit
Presets
Content-Type
application/x-www-form-urlencoded
New key
Value
Description
Body
Cookies
Headers (7)
Test Results
Status: 200 OK
Time: 39 ms
Pretty
Raw
Preview
JSON
{
"data": [
{
"id": 65,
"title": "鴻海神救援 iPhone X出貨變快",
"content": "根據蘋果網站的訊息，在美國和加拿大，iPhone X新訂單的交貨等待時間已減為二至三周，比先前估計的等候時間縮短一周，顯示供應情況已有改善，生產逐漸跟上需求，也可能顯示鴻海集團等供應鏈的「救火」行動出現成效。",
"done": 0
},
{
"id": 64,
"title": "出售共有房地 放寬課稅規定",
"content": "財政部近日公告，非自願出售「共有」房地，其房地持有未滿兩年，仍可適用20%較低稅率，放寬房地合一制度規則。已自11月17日生效。",
"done": 1


PUT
http://localhost:3000/api/todos/40
Params
Send
Save
Authorization
Headers (1)
Body
Pre-request Script
Tests
Code
form-data
x-www-form-urlencoded
raw
binary
Key
Value
Description
Bulk Edit
title
小食點空心，台灣本土懷舊零食點心大集合修改後
content
零食，又稱休閒食品，在全球是門3,740億美元的生意，...
New key
Value
Description
Body
Cookies
Headers (6)
Test Results
Status: 200 OK
Time: 106 ms
Pretty
Raw
Preview
JSON
{
"message": "修改成功"
}


PUT
localhost:3000/api/todos/toggledone/40
Params
Send
Save
Key
Value
Description
Bulk Edit
New key
Value
Description
Authorization
Headers (1)
Body
Pre-request Script
Tests
Code
form-data
x-www-form-urlencoded
raw
binary
Key
Value
Description
Bulk Edit
done
not done
New key
Value
Description
Body
Cookies
Headers (6)
Test Results
Status: 200 OK
Time: 115 ms
Pretty
Raw
Preview
JSON
{
"message": "toggleDone is changed"
}


DELETE
localhost:3000/api/todos/65
Params
Send
Save
Authorization
Headers (1)
Body
Pre-request Script
Tests
Code
Key
Value
Description
Bulk Edit
Presets
Content-Type
application/x-www-form-urlencoded
New key
Value
Description
Body
Cookies
Headers (7)
Test Results
Status: 200 OK
Time: 124 ms
Pretty
Raw
Preview
JSON
{
"data": "删除成功"
}


PUT
localhost:3000/api/todos/64
Params
Send
Save
Authorization
Headers (1)
Body
Pre-request Script
Tests
Code
form-data
x-www-form-urlencoded
raw
binary
Key
Value
Description
Bulk Edit
title
出售共有房地 放寬課稅規定11111111
content
財政部近日公告，非自願出售「共有」房地，其房地持有...
New key
Value
Description
Body
Cookies
Headers (7)
Test Results
Status: 200 OK
Time: 41 ms
Pretty
Raw
Preview
JSON
{
"data": [
{
"id": 64,
"title": "出售共有房地 放寬課稅規定",
"content": "財政部近日公告，非自願出售「共有」房地，其房地持有未滿兩年，仍可適用20%較低稅率，放寬房地合一制度規則，已自11月17日生效
。",
"done": 1
},
{
63,

localhost:3000/api/todos

```
// 20171122110108
// http://localhost:3000/api/todos

{
  "data": Array[9][
    {
      "id": 64,
      "title": "出售共有房地 放寬課稅規定11111111",
      "content": "財政部近日公告，非自願出售「共有」房地，其房地持有未滿兩年，仍可適用20%較低稅率，放寬房地合一制度規則。已自11月17日生效。11111111111",
      "done": 1
    },
    {
      "id": 63,
      "title": "陸股雙11行情 引爆",
      "content": "由阿里巴巴發起的「1111光棍節」大購物日將於本周六登場。法人分析，今年淘寶天貓雙11光棍節銷售額上看人民幣1,500億元（約新台幣6,825億元），建議投資人以主動式大中華股票型基金，掌握陸股中的相關題材",
      "done": 0
    },
    {
      "id": 58,
      "title": "國門陸橋大火 清潔隊員被法辦",
      "content": "警方調查結果，排除人為縱火之嫌，已將負責管理的環保局蘆竹清潔隊邱姓隊員，依公共危險罪嫌函送桃園地檢署偵辦。",
      "done": 1
```

課程完成品
程式Demo