Unit Testing Configuration

Guide for installing and setting up the needed libraries and frameworks to allow local testing of JavaScript code with Visual Studio Code for the "Back-End Technologies Basics" course @ SoftUni.

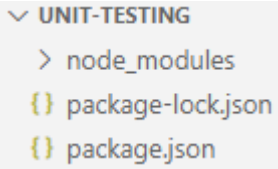
Visual Studio Code Configuration

It's **generally recommended** to install testing libraries **locally within each project**. This ensures that each project has the **correct version** of the library it needs and that all project **dependencies** are clearly **documented** in the **package.json** file.

Open the **terminal** in Visual Studio Code, navigate to the directory of your project and execute the following commands:

```
npm init
npm install
npm install chai
npm install mocha
```

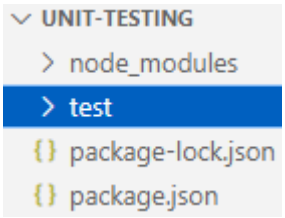
The structure of your **UNIT-TESTING** folder should look something like this:



Running Our First Mocha Test

In order to be able to **run Mocha tests**, you have to make some **additional steps**.

Start by creating a new folder, named "**test**", in the directory where you ran the commands from above. Your **UNIT TESTING** folder should look like this:



For the purposes of this session, it **doesn't matter** which standard you'd prefer to use – **ESM** or **CommonJS**. Below you will find instructions on how to run your tests in both ways. Remember that the Judge system expects only the testing code, without the **`imports/exports`** / **`require()/module.exports`** code.

ESM

If you want to use the **ESM standard**, follow the steps below.

Add a **new file** to the **UNIT-TESTING** folder and name it **sumNumbers.js**.

Use the code bellow:

sumNumbers.js

```
export function sum(arr) {
    let sum = 0;
    for (let num of arr){
        sum += Number(num);
    }
    return sum;
}
```

Now, add a new file to the **test** folder and name it **sumNumbersTest.js**. Use the code below:

sumNumbersTest.js

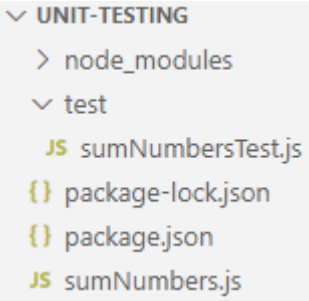
```
import { expect } from 'chai';
import { sum } from '../sumNumbers.js';

describe('Sum numbers', () => {
    it('sums single number', () => {
        expect(sum([1])).to.equal(1);
    });

    // Test overloading
    it('sums multiple numbers', () => {
        expect(sum([1,1])).to.equal(2);
    });

    it('sums different numbers', () => {
        expect(sum([2,3,4])).to.equal(9);
    });
});
```

Your **UNIT-TESTING** folder should look like this:



If we want to use the standard '**.js' extension** for the **test** files, when using the **ESM Standard**, we have two options:

- We can rename the test files and give them the '**.mjs**' extension
- We can keep the extension '**.js**', but we have to add **`"type": "modules"`** in our **package.json** file. This specifies that the '**.js**' files are **ES modules**.

In this tutorial, we will choose the second option.

There are two ways to run Mocha tests. The first one is using the command **`mocha`**, which by default **will look** for **test files** in the **"test" directory** and **run all of them.** If you want to **run specific test files,** use the command **`mocha path/to/test.js`.**

For our example, we will use the **mocha** command. This is the **other** change that we have to make in our **package.json** file.

In order to **use** the **mocha** command, we will add it to the **scripts** section in the **package.json** file and indicate to our Node.js project to run this command when we type **npm test command.**

NOTE: The **scripts** section in the **package.json** file defines shortcuts for custom shell commands that are related to the lifecycle of a Node.js project. It allows developers to run tasks such as starting the application, running tests, or custom build processes with simple commands like **npm start** or **npm test**.

Finally, your **package.json** file should look like this:

```
{
  "name": "unit-testing",
  "version": "1.0.0",
  "type": "module", ①
  "description": "",
  "main": "index.js",
   ▷ Debug
  "scripts": {
    "test": "mocha" ②
  },
  "author": "SoftUni",
  "license": "ISC",
  "dependencies": {
    "chai": "^5.0.0",
    "mocha": "^10.2.0"
  }
}
```

After we have made our changes, we can simply open a terminal and run the command **npm test**. If you have set up everything correctly, you should get this output:

```
PS C:\Users\              \Desktop\UNIT-TESTING> npm test

> unit-testing@1.0.0 test
> mocha



  Sum numbers
    ✓ sums single number
    ✓ sums multiple numbers
    ✓ sums different numbers


  3 passing (4ms)
```

CommonJS

If you chose the CommonJS standard, you don't have to change the file extension of the test files and you don't need to add **"type": "module"** in the **package.json** file.

The **sumNumbers.js** should look like the code below:

sumNumbers.js

```
function sum(arr) {
    let sum = 0;
    for (let num of arr){
        sum += Number(num);
    }
    return sum;
}
module.exports = { sum };
```

The **sumNumbersTest.js** should look like the code below:

sumNumbersTest.js

```
const { expect } = require('chai');
const { sum } = require('../sumNumbers');

describe('Sum numbers', () => {
    it('sums single number', () => {
        expect(sum([1])).to.equal(1);
    });

    // Test overloading
    it('sums multiple numbers', () => {
        expect(sum([1,1])).to.equal(2);
    });

    it('sums different numbers', () => {
        expect(sum([2,3,4])).to.equal(9);
    });
});
```

We are still going to use the **`scripts`** section of the **package.json** file to run the test.

However, the **latest versions** of **Chai** are **ES modules**, which can't be loaded, if we want to use the **`require()`/`module.exports`** syntax. To fix this error, we will have to **downgrade** to a version of Chai, which still **supports** CommonJS.

To downgrade the version of Chai, we will make changes in the **`dependencies`** section of the **package.json** file. Finally, it should look like this:

```
{
  "name": "unit-testing",
  "version": "1.0.0",
  "description": "",
  "main": "index.js",
  ▷ Debug
  "scripts": {
    "test": "mocha"
  },
  "author": "SoftUni",
  "license": "ISC",
  "dependencies": {
    "chai": "^4.3.4",
    "mocha": "^10.2.0"
  }
}
```

(1) (2)

After we have made changes to the dependencies section, we have to run the **`npm install`** command again in order for the changes to the version to take effect.

Our next step is to simply open a terminal and run the command **`npm test`**. If you have set up everything correctly, you should get this output:

```
PS C:\Users\              \Desktop\UNIT-TESTING> npm test

> unit-testing@1.0.0 test
> mocha



  Sum numbers
    ✓ sums single number
    ✓ sums multiple numbers
    ✓ sums different numbers


  3 passing (4ms)
```

Congratulations! You have run your first Mocha and Chai test! 😊