

PROGRAMMING BASED PLATFORM ASSIGNMENT

IMPLEMENTATION OF MODULARIZATION AND NPM PACKAGE PUBLICATION

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1. Introduction: The Concept of Modularization

Modularization is an approach in software development where program code is divided into smaller, independent parts called modules. Each module is designed to perform a specific function, making it easier to manage, test, and maintain.

In the context of Node.js, modularization is a fundamental concept that allows us to:

- **Organize Code:** Keep files from becoming too large and complex by separating functionalities into different files.
- **Improve Readability:** Code becomes easier to understand because it is structured by function.
- **Encourage Reusability:** The same module can be imported and reused in various parts of the application or even in other projects.
- **Isolate Scope (Encapsulation):** Variables and functions inside a module are local (not global), preventing naming conflicts with other modules.

Node.js uses the CommonJS module system, which works with two main commands:

- **module.exports** to expose or provide functions/data from a module.
- **require()** to import or use those functions/data in another file.

2. Project Structure: Calculator Package

This project aims to create a simple calculator package that can be published to NPM. Its structure is designed to be easily used by other developers.

The structure:

Week_05

- index.js
- penjumlahan.js
- pengurangan.js
- perkalian.js
- pembagian.js
- package.json

penjumlahan.js, pengurangan.js, perkalian.js, pembagian.js:

- Each file is an independent module containing only one mathematical function.
- These functions are exported using module.exports.

index.js:

This is the main entry point of the package. It imports the four operation modules above and re-exports them in a single object. This way, users only need to import this file once to access all functionalities.

package.json:

Contains essential information about the package such as name, version, description, and main file ("main": "index.js").

3. Implementation and NPM Publication Process

The steps taken to create and publish this package are as follows:

Project Initialization:

The project was initialized using `npm init -y` to create a basic package.json file.

Module Creation:

The four functional modules (`penjumlahan.js`, etc.) were created. Each module exports one arrow function.

Entry Point Creation:

The `index.js` file was created to combine all modules into a single export, simplifying package usage.

package.json Configuration:

The package.json file was edited to add important metadata such as description, keywords, author, and license. The package name was chosen in a scoped format (`@adambastian/calculator`) to make it unique.

NPM Login:

Logged into the NPM account through the terminal using the `npm login` command.

Publication Process:

The command `npm publish` was initially executed, but resulted in the error E402 Payment Required.

This occurred because NPM treats scoped packages (those starting with `@username/`) as private by default, which requires a paid subscription.

Publication Solution:

To resolve this issue and publish the package publicly and for free, the command was modified to **`npm publish --access public`**

The `--access public` flag explicitly tells NPM to register the package as a public package, even if it is scoped.

4. Execution Proof

Below are screenshots showing the successful implementation process:

Screenshot of Successful Publication:

```
C:\Users\Axiio Hype 7\OneDrive\Documents\js_learning\week_05> npm publish --access public
sugger attached.
notice
notice @adambastian/calculator@1.0.0
notice Tarball Contents
notice 978B index.js
notice 380B package.json
notice 71B pembagian.js
notice 75B pengurangan.js
notice 76B penjumlahan.js
notice 71B perkalian.js
notice Tarball Details
notice name: @adambastian/calculator
notice version: 1.0.0
notice filename: adambastian-calculator-1.0.0.tgz
notice package size: 764 B
notice unpacked size: 1.7 kB
```

The screenshot shows the npmjs.com website interface. At the top, there's a navigation bar with the npm logo, a search bar labeled "Search packages", and a user profile icon. Below the navigation bar, a yellow banner displays an important security update: "Important security changes to npm authentication take effect October 13, 2025. New token lifetime limits (90-day max) and TOTP 2FA restrictions become effective. Classic tokens will be revoked in November. Review changes and update your workflows now. [Learn more](#)."

The main content area is divided into two sections. On the left, a sidebar menu lists user settings: Profile, Packages, Account, Billing Info, Access Tokens, and Organizations (with a plus icon). The right section, titled "1 package", lists the user's published packages. The first package is "@adambastian/calculator", described as "Appcalculator by adam bastian chaniago ti24i informatics engineering study program". It shows the package was published by "adambastian" on "1.0.0" version, "2 minutes ago".

At the bottom of the page, there are four columns of links: "Support" (Help, Advisories), "Company" (About, Blog), "Terms & Policies" (Policies, Terms of Use), and a footer area with icons for npm and GitHub.

Screenshot of Package Usage in Another Project:

The screenshot shows the VS Code interface with the Explorer view on the left displaying a file tree for a project named 'js_learning'. The file 'package-lock.json' is selected and its content is visible in the main editor. The package-lock.json file contains the following JSON structure:

```
{
  "name": "test",
  "version": "1.0.0",
  "lockfileVersion": 3,
  "requires": true,
  "packages": {
    "": {
      "name": "test",
      "version": "1.0.0",
      "license": "ISC",
      "dependencies": {
        "@adambastian/calculator": "1.0.0"
      }
    },
    "node_modules/@adambastian/calculator": {
      "version": "1.0.0",
      "resolved": "https://registry.npmjs.org/@adambastian/calculator",
      "integrity": "sha512-M6b8wSP0Y8aQ9c5dTF1NPEBtlw3f0cnc",
      "license": "ISC"
    }
  }
}
```

The terminal window on the right shows the command prompt output for the installation of @adambastian/calculator:

```
MINGW64/c/Users/Axioo Hype 7/OneDrive/Documents/js_learning/week_05/test
$ npm init -y
Wrote to C:\Users\Axioo Hype 7\OneDrive\Documents\js_learning\week_05\test\package.json:

{
  "name": "test",
  "version": "1.0.0",
  "description": "",
  "main": "index.js",
  "scripts": {
    "test": "echo \"Error: no test specified\" && exit 1"
  },
  "keywords": [],
  "author": "",
  "license": "ISC"
}

Axioo Hype 7@DESKTOP-QHRFBCD MINGW64 ~/OneDrive/Documents/js_learning/week_05/test (main)
$ npm install @adambastian/calculator
added 1 package, and audited 2 packages in 3s
found 0 vulnerabilities

Axioo Hype 7@DESKTOP-QHRFBCD MINGW64 ~/OneDrive/Documents/js_learning/week_05/test (main)
$
```

The screenshot shows the VS Code interface with the Explorer view on the left displaying a file tree for a project named 'js_learning'. The file 'index.js' is selected and its content is visible in the main editor. The index.js file contains the following JavaScript code:

```
1 console.log("=== calculatorAPP ===")
2 const tambah = require("./penjumlahan.js"); // impor module
3 const kurang = require("./pengurangan.js");
4 const kali = require("./perkalian.js");
5 const bagi = require("./pembagian.js");
6
7 const angka1 = 12;
8 const angka2 = 2;
9 console.log("angka pertama ${angka1}");
10 console.log("angka kedua ${angka2}");
11 console.log("=====");
12 const hasilTambah = tambah(angka1, angka2); // 14
13 console.log("Hasil penjumlahan: ${hasilTambah}");
14 console.log("=====");
15 const hasilKurang = kurang(angka1, angka2); // 10
16 console.log("Hasil pengurangan: ${hasilKurang}");
17 console.log("=====");
18 const hasilKali = kali(angka1, angka2); // 24
19 console.log("Hasil perkalian: ${hasilKali}");
20 console.log("=====");
21 const hasilBagi = bagi(angka1, angka2); // 6
22 console.log("Hasil pembagian: ${hasilBagi}");
23
```

The terminal window on the right shows the command prompt output for running the calculator application:

```
MINGW64/c/Users/Axioo Hype 7/OneDrive/Documents/js_learning/week_05/test
$ npm init -y
Wrote to C:\Users\Axioo Hype 7\OneDrive\Documents\js_learning\week_05\test\package.json:

{
  "name": "test",
  "version": "1.0.0",
  "description": "",
  "main": "index.js",
  "scripts": {
    "test": "echo \"Error: no test specified\" && exit 1"
  },
  "keywords": [],
  "author": "",
  "license": "ISC"
}

Axioo Hype 7@DESKTOP-QHRFBCD MINGW64 ~/OneDrive/Documents/js_learning/week_05/test (main)
$ npm install @adambastian/calculator
added 1 package, and audited 2 packages in 3s
found 0 vulnerabilities

Axioo Hype 7@DESKTOP-QHRFBCD MINGW64 ~/OneDrive/Documents/js_learning/week_05/test (main)
$ ls
node_modules/ package-lock.json package.json

Axioo Hype 7@DESKTOP-QHRFBCD MINGW64 ~/OneDrive/Documents/js_learning/week_05/test (main)
$
```