



Arduino-IoT

[wk02]

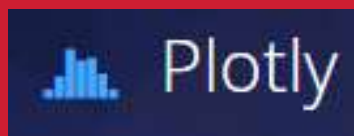
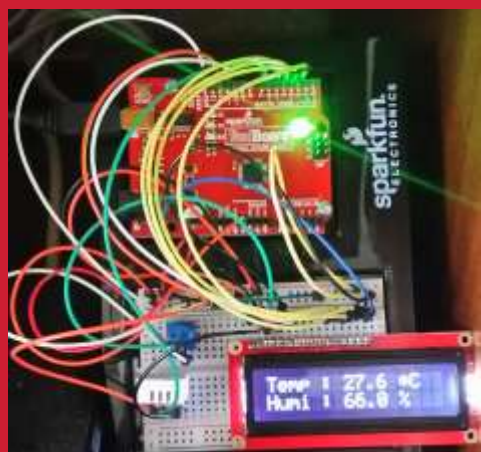
node.js intro

Visualization of Signals using Arduino,
Node.js & storing signals in MongoDB
& mining data using Python

Comsi, INJE University

2nd semester, 2019

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My ID

ID	성명
AA01	김관용
AA02	백동진
AA03	김도훈
AA04	김희찬
AA05	류재현
AA06	문민규
AA07	박진석
AA08	이승협
AA09	표혜성
AA10	김다영
AA11	성소진
AA12	김해인
AA13	신송주
AA14	윤지훈



[Review]

◆ [wk01]

➤ test : aann.html

wk01 : aann.html

- ◆ [Target of this week] Make **aann.html** using Sublime text3



```

D:\Portable\Sublime Text Build 3143 x64\Data\aa00\aaann.html (aa00) - Sublime Text (UNREGISTERED)
File Edit Selection Find View Settings Tools Project Preferences Help
FOLDERS
  aa00
    aann.html
1 <html>
2   <head>
3
4   </head>
5
6   <body>
7     <h2>Hello aa00!</h2>
8   </body>
9
10 </html>

```

서브라임텍스트3 에서 html파일 크롬 으로 실행하기

1. 댓글

서브라임텍스트3에서 html파일을 작업하다가 페이지를 바로 크롬 브라우저로 실행하는 방법이다.

1. 서브라임텍스트3 에서 Tools > Build System > New Build System

```
1
2 {
3   "cmd":
4     ["c:\\ProgramFiles\\Google\\Chrome\\Application\\chrome.exe", "$file"]
5 }
```

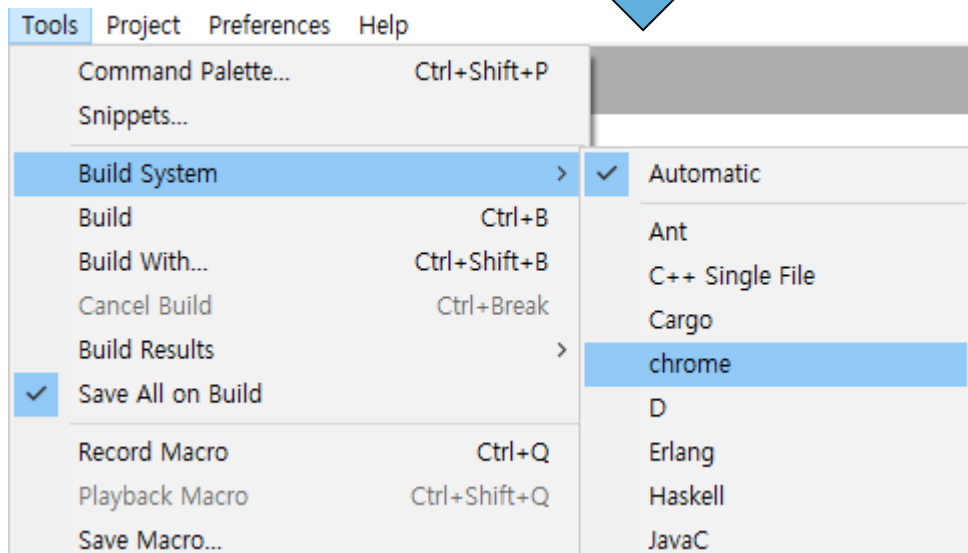
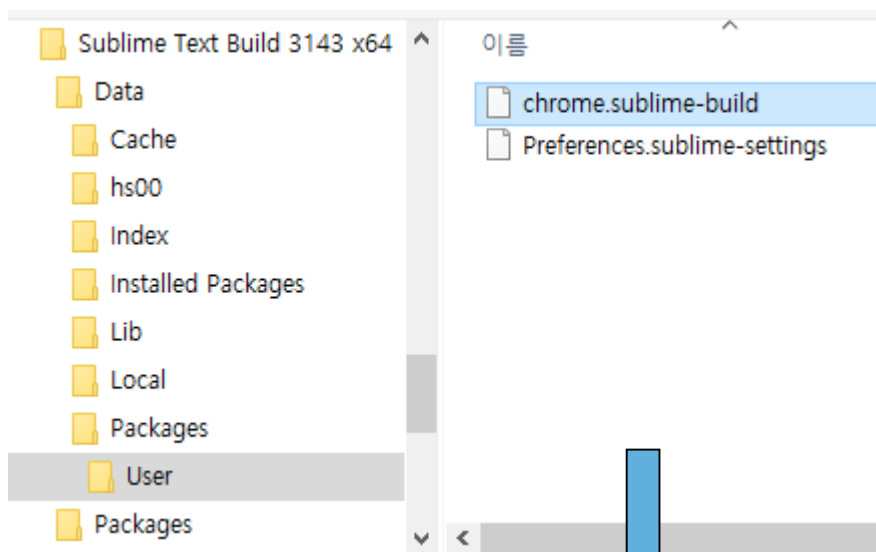
2. 위와 같이 작성하고 Chrome.sublime-build 이름으로 저장한다.

여기서 주의해야할 사항은 Chrome.exe 위치가 다를 수도 있으니 확인해보고 작성한다. 나는 programFilex (x86) 에 있어서 수정하고 적용했다. 그리고 역슬래시는 두개씩(\\) 들어간다.

3. 프로그램을 재실행 한 후 Tools > Build System에 Chrome이라고 생겼으면 확인하고 선택한다.

4. html 파일에서 Ctrl + b를 누르면 크롬에서 바로 실행된다.

wk01 : aann.html



[중요]

Portable SW에서는
모든 사용자 추가 기능이

윈도우의 설정 공간이
아니라 포터블 **SW**가
설치된 폴더 내에 저장된다.

→ **USB**에 **portable SW**를
담아서 어디서든지
사용 가능하다.

wk01 : aann.html – result!

D:\Portable\Sublime Text Build 3143 x64\Data\aa00\aaann.html (aa00) - Sublime Text (UNREGISTERED)

File Edit Selection Find View Goto Tools Project Preferences Help

FOLDERS

- aa00
 - aaann.html

```

1  <html>
2      <head>
3
4      </head>
5
6      <body>
7          <h2>Hello aa00!</h2>
8      </body>
9
10 </html>

```





1.0 What is node.js?





1.0 What is node.js?

← → ↻ 🏠 안전함 | https://www.w3schools.com/nodejs/nodejs_intro.asp

🏠 HTML CSS JAVASCRIPT SQL PHP BOOTSTRAP HOW TO JQUERY MORE ▼

Node.js Tutorial
Node.js HOME
Node.js Intro
Node.js Get Started
Node.js Modules
Node.js HTTP Module
Node.js File System
Node.js URL Module
Node.js NPM
Node.js Events
Node.js Upload Files
Node.js Email

Node.js MySQL
MySQL Get Started
MySQL Create Database
MySQL Create Table

Node.js Introduction

◀ Previous

What is Node.js?

- Node.js is an open source server framework
- Node.js is free
- Node.js runs on various platforms (Windows, Linux, Unix, Mac OS X, etc.)
- Node.js uses JavaScript on the server

Why Node.js?

Node.js uses asynchronous programming!

https://www.w3schools.com/nodejs/nodejs_intro.asp



1.0 What is node.js?

Javascript on Server

Node.js is an open-source, runtime environment for developing **server-side and network applications in JavaScript**.

Its **event-driven architecture and non-blocking I/O model** makes it ideal for building **real-time applications that run across distributed devices**.



1.1 What is node.js?



홈 | ABOUT | 다운로드 | 문서 | 재단 | 참여하기 | 보안 | 뉴스

Node.js®에 대해서

비동기 이벤트 주도 JavaScript 런타임으로써 Node는 확장성 있는 네트워크 애플리케이션을 만들 수 있도록 설계되었습니다. 다음 "hello world" 예제는 다수의 연결을 동시에 처리할 수 있습니다. 각 연결에서 콜백이 실행되는데 실행할 작업이 없다면 Node는 대기합니다.

```
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}/`);
});
```



1.2 What is node.js?

- **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.**



1.3 Non-blocking IO

Blocking Code

```
var contents = readFile('/path/some/file.txt');  
console.log(contents);  
console.log('Another independent operation');
```

Non-Blocking Code

```
var contents = readFile('/path/some/file.txt', function(err, contents){  
    console.log(err || contents);  
});  
  
console.log('Another independent operation');
```

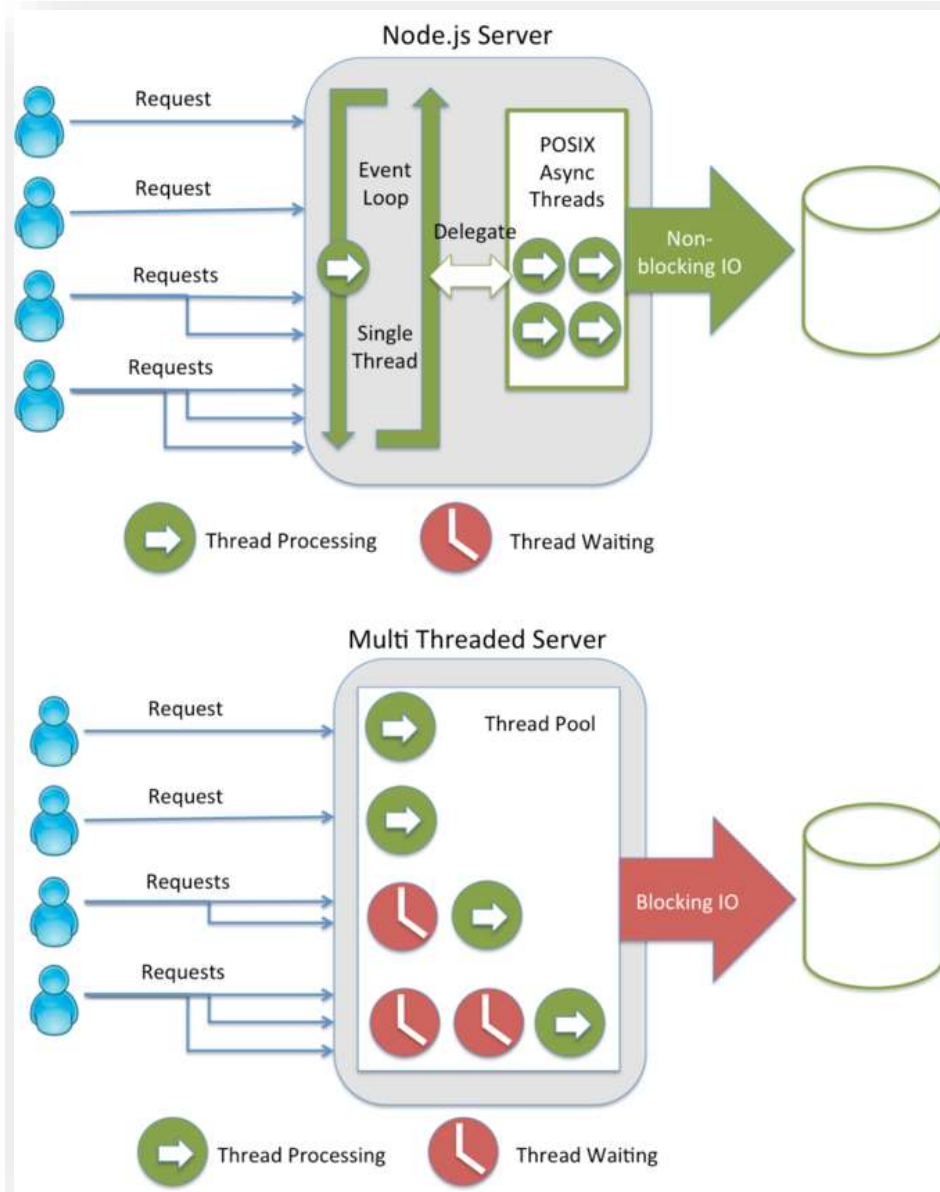
[Quiz] 계란 1개를 삶을 때 10분이 걸린다.

그러면 계란 10개를 삶을 때 걸리는 시간은?

Blocking : ?

Non-blocking : ?

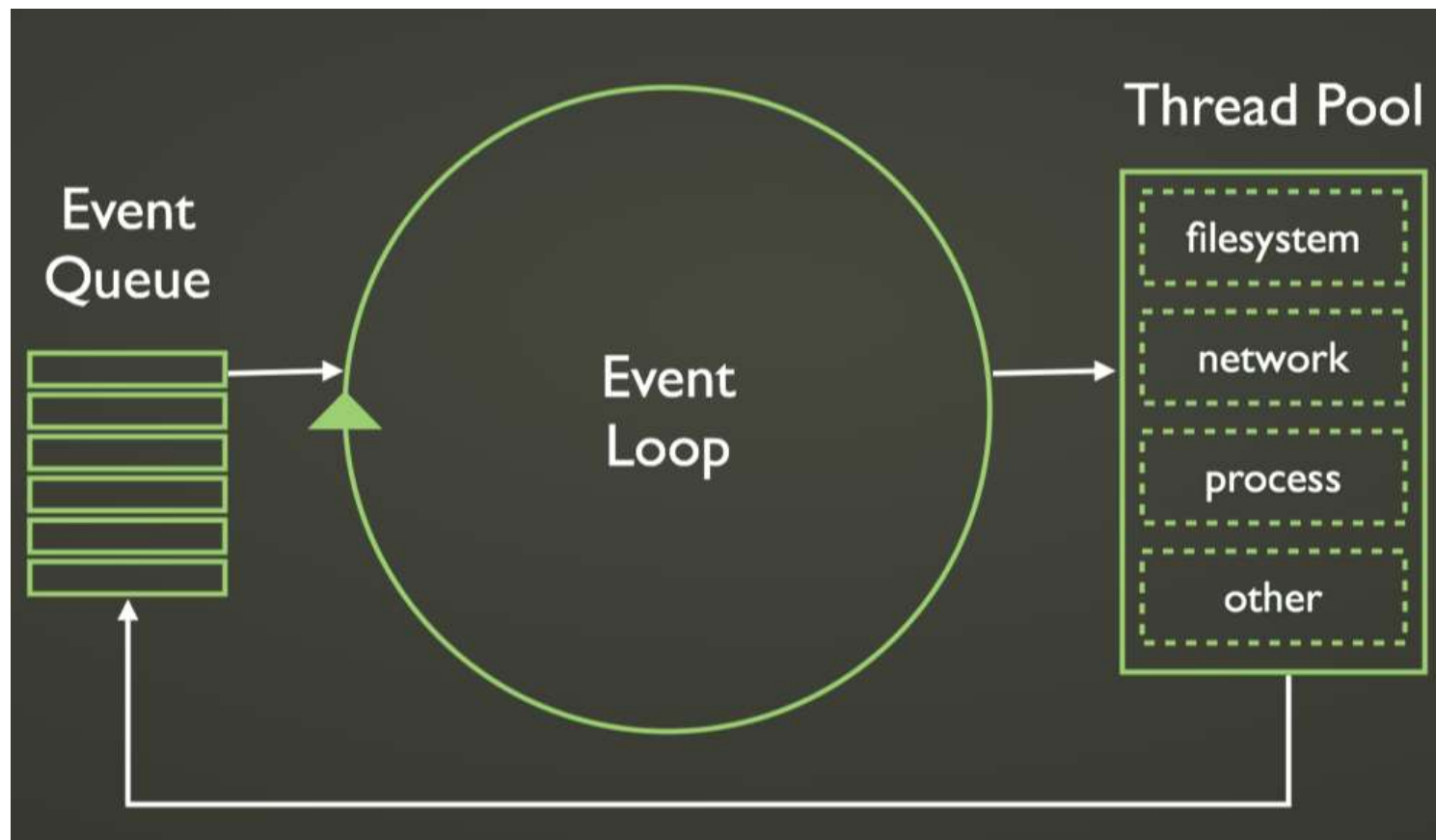
1.3 Non-blocking IO



Single thread
Non-blocking IO

Multi thread
Blocking IO

1.4 Non-blocking event loop





2.1 Install node.js



다운로드

최신 LTS 버전: 8.10.0 (includes npm 5.6.0)

플랫폼에 맞게 미리 빌드된 Node.js 인스톨러나 소스코드를 다운받아서 바로 개발을 시작하세요.

LTS
대다수 사용자에게 추천

현재 버전
최신 기능

Windows Installer
node-v8.10.0-x64.msi

macOS Installer
node-v8.10.0.pkg

Source Code
node-v8.10.0.tar.gz

Windows Installer (.msi)

Windows Binary (.zip)

macOS Installer (.pkg)

macOS Binary (.tar.gz)

Linux Binaries (x86/x64)

Linux Binaries (ARM)

Source Code

32-bit	64-bit
32-bit	64-bit
64-bit	
64-bit	
32-bit	64-bit
ARMv6	ARMv7
ARMv8	
node-v8.10.0.tar.gz	

<https://nodejs.org/ko>



2.2 Install node.js portable



<https://gareth.flowers/nodejs-portable/>



2.2 Install node.js portable

The screenshot shows the GitHub repository page for `garethflowers/nodejs-portable`. The page is titled "NodeJS Portable v5.7.0" and indicates it was released on 26 Feb 2016. A list of updates shows "Updated to NodeJS v5.7.0." Under the "Downloads" section, the file `NodeJSPortable_5.7.0.paf.exe` is highlighted with a red dashed box. Other download options include "Source code (zip)" and "Source code (tar.gz)".

Latest release

v5.7.0
3d91ba6

NodeJS Portable v5.7.0

garethflowers released this on 26 Feb 2016 · 2 commits to master since this release

- Updated to NodeJS v5.7.0.

Downloads

- `NodeJSPortable_5.7.0.paf.exe`
- Source code (zip)
- Source code (tar.gz)

<https://github.com/garethflowers/nodejs-portable/releases/>



2.2.1 Install node.js portable v5.12.0

The screenshot shows the GitHub repository page for 'nodejs-portable' by 'garethflowers'. The repository has 12 watchers and 6 issues. The 'Releases' tab is selected, showing the latest release 'NodeJS Portable v5.12.0' released on 31 May. The release has 3 assets: 'NodeJSPortable_5.12.0_online.paf.exe' (highlighted with a red dashed box), 'Source code (zip)', and 'Source code (tar.gz)'. A note below the assets says 'Switch to using an online installer.'

Search or jump to... Pull requests Issues Marketplace Explore

garethflowers / nodejs-portable Watch 12

Code Issues 6 Pull requests 3 Projects 0 Wiki Insights

Releases Tags

Latest release

5.12.0 49ed262

NodeJS Portable v5.12.0

garethflowers released this on 31 May

Assets 3

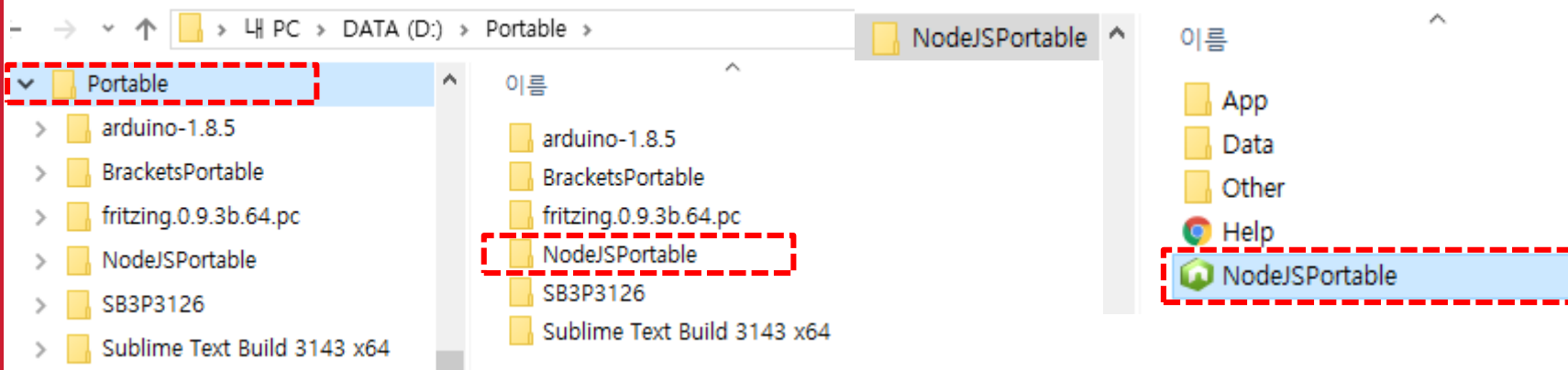
- NodeJSPortable_5.12.0_online.paf.exe
- Source code (zip)
- Source code (tar.gz)

- Switch to using an online installer.

<https://github.com/garethflowers/nodejs-portable/releases/>



2.2 Install node.js portable





2.3.1 Verify installation

```
ca: npm
D:\Portable\NodeJSPortable\Data>node -v
v5.12.0

D:\Portable\NodeJSPortable\Data>npm -v
npm WARN npm npm does not support Node.js v5.12.0
npm WARN npm You should probably upgrade to a newer version of node as we
npm WARN npm can't make any promises that npm will work with this version.
npm WARN npm Supported releases of Node.js are the latest release of 4, 6, 7, 8, 9.
npm WARN npm You can find the latest version at https://nodejs.org/
5.8.0

D:\Portable\NodeJSPortable\Data>■
```

node -v

npm -v



2.3.2 Check node folders.

```
cmd npm
D:\Portable\NodeJSPortable\Data>dir
D 드라이브의 볼륨: DATA
볼륨 일련 번호: 7A01-106A

D:\Portable\NodeJSPortable\Data 디렉터리

2018-09-03 오후 03:46 <DIR> .
2018-09-03 오후 03:46 <DIR> ..
2018-09-03 오전 11:12 <DIR> aa00
2018-09-03 오후 12:21 <DIR> aann
2018-09-03 오후 03:46 89 PortableApps.comLauncherRuntimeData-NodeJSPortable.ini
2018-09-03 오전 10:23 <DIR> settings
                        1개 파일                89 바이트
                        5개 디렉터리 852,355,227,648 바이트 남음

D:\Portable\NodeJSPortable\Data>
```

Data folder



2.4 Testing node.js – node shell

NodeJS

```
D:\Portable\NodeJSPortable\Data>node
> a=2
a=2
2
> b=5
5
> c=a+b
7
> a*b
10
> a/b
0.4
>
(To exit, press ^C again or type .exit)
>
D:\Portable\NodeJSPortable\Data>
```

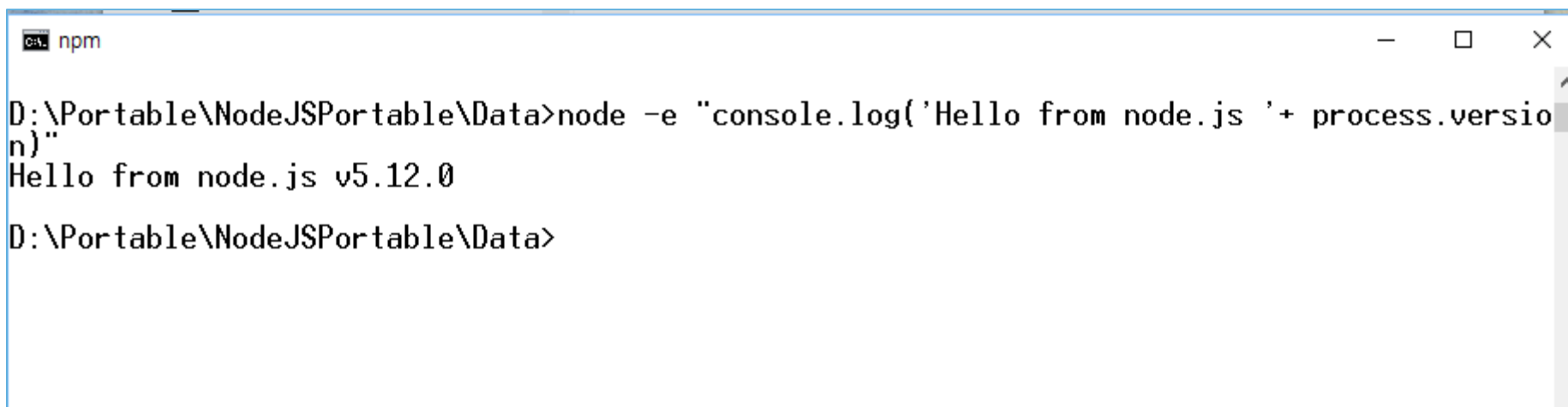
```
// node shell
node
>
>
// exit
^C^C
```



2.5 Testing node.js – final test

Final test if Node.js was installed correctly:

`node -e "console.log('Hello from node.js ' + process.version)"`



```
npm
D:\Portable\NodeJSPortable\Data>node -e "console.log('Hello from node.js ' + process.version)"
Hello from node.js v5.12.0
D:\Portable\NodeJSPortable\Data>
```




Using node.js

in Sublime text 3

→ Node build system



3.1 Using node.js in Sublime text 3

- Node.js 연결 : Tools > Build System > New Build System

```
{  
    "cmd": ["node.exe path", "$file"],  
    "selector": "source.js"  
}
```

Node.sublime-build 로 저장

D:\Portable\Sublime Text Build 3176\Data\Packages\User\Node.sublime-build (aa00, aann) - Sublime Text (UNREGISTERED)

File Edit Selection Find View Goto Tools Project Preferences Help

FOLDERS

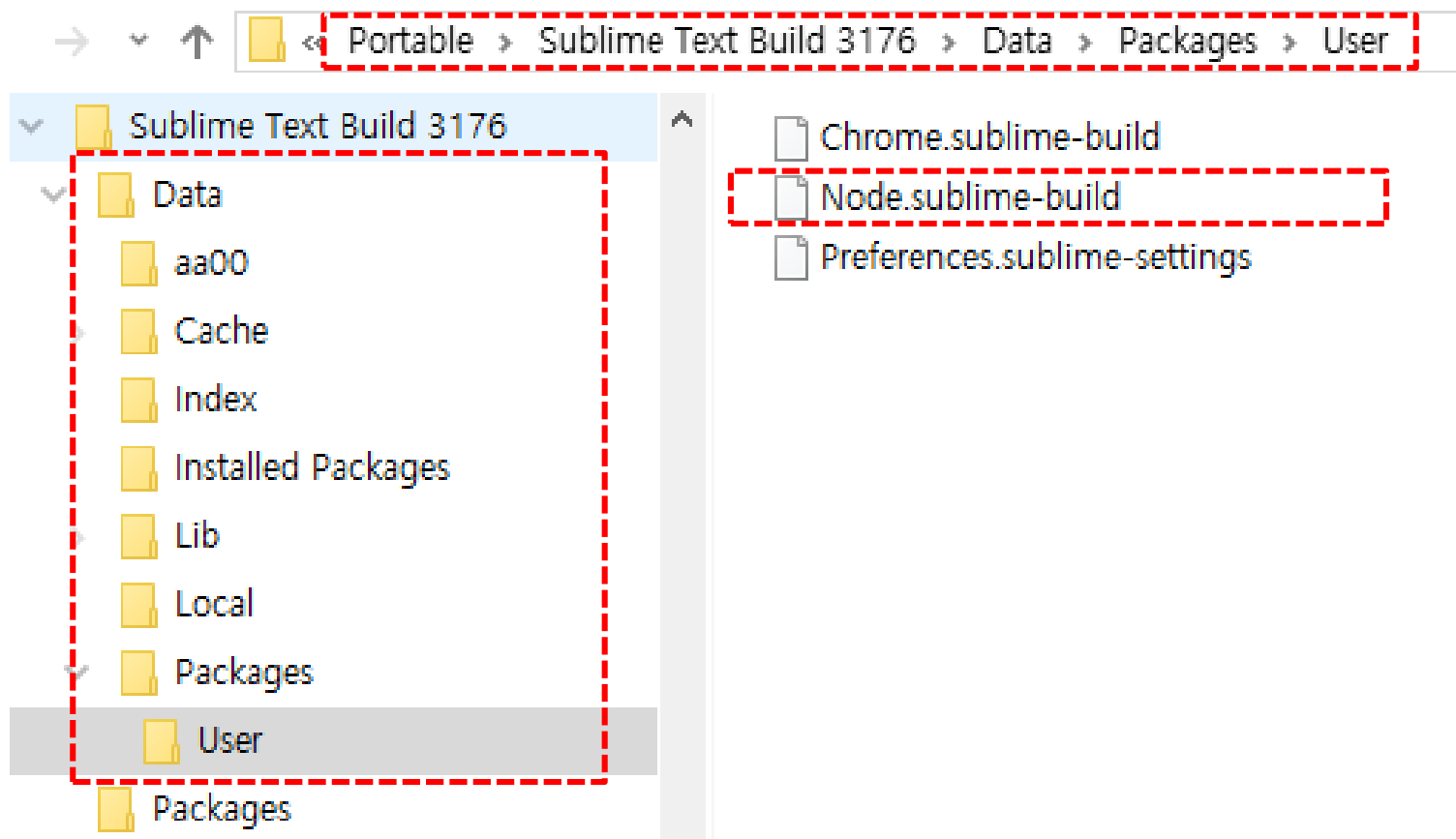
▶ aa00
▼ aann
▶ start

```
1 {  
2     "cmd": ["D:\\Portable\\NodeJSPortable\\App\\node.exe", "$file"],  
3     "selector": "source.js"  
4 }  
5
```



3.2 Using node.js in Sublime text 3

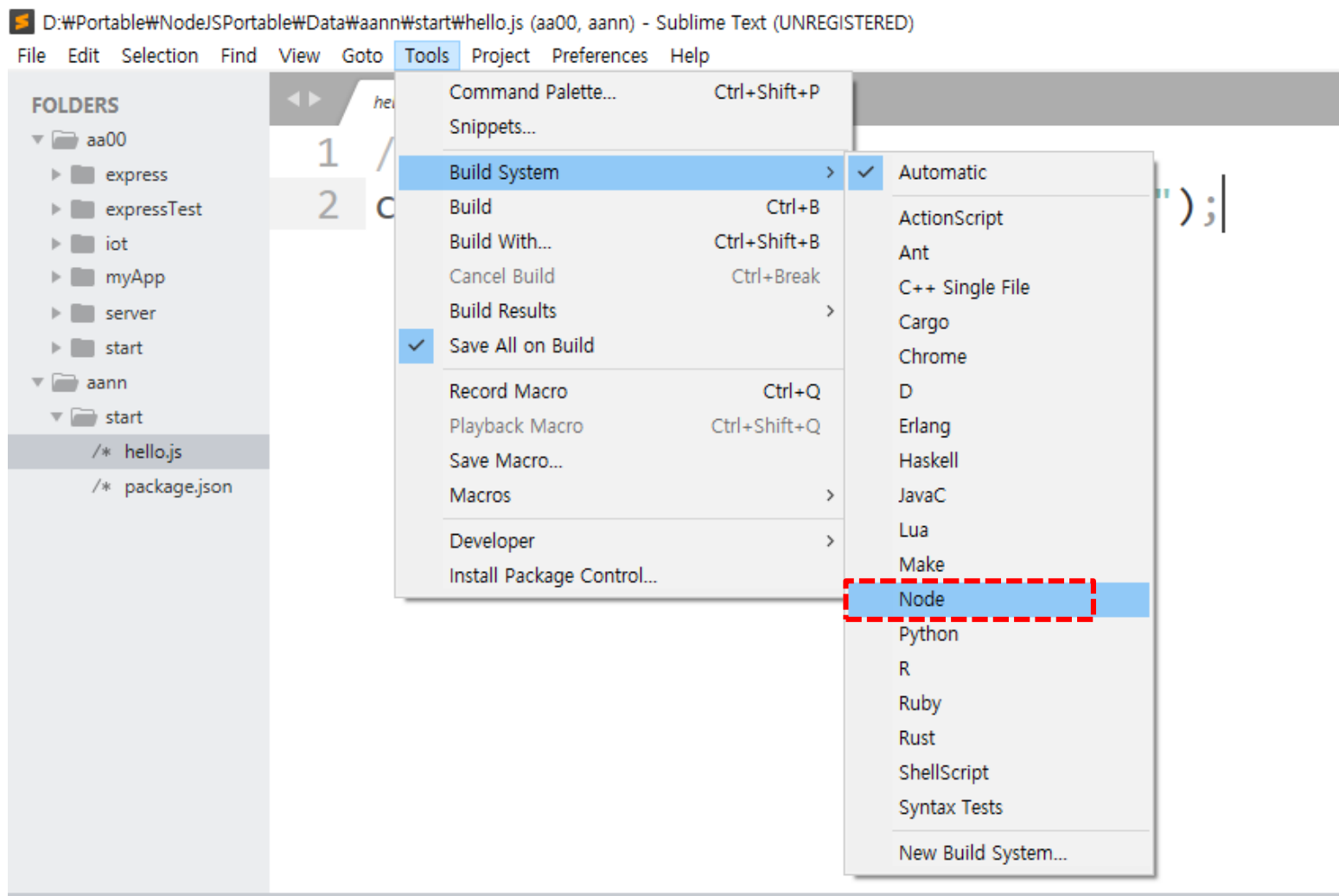
● Node.js 설정 파일 저장 폴더 확인 (Portable Sublime text 3)





3.3 Using node.js in Sublime text 3

● Node.js 연결 : Check node from Build System





Node.js Project

npm init



4.1 Node project : md aann

```
npm
):\Portable\NodeJSPortable\Data>md aann
):\Portable\NodeJSPortable\Data>cd aann
):\Portable\NodeJSPortable\Data\aann>md start
):\Portable\NodeJSPortable\Data\aann>cd start
):\Portable\NodeJSPortable\Data\aann\start>dir
D 드라이브의 볼륨: DATA
볼륨 일련 번호: 7A01-106A

D:\Portable\NodeJSPortable\Data\aann\start 디렉터리

2018-09-03 오후 12:21 <DIR> .
2018-09-03 오후 12:21 <DIR> ..
                0개 파일                0 바이트
                2개 디렉터리  852,351,586,304 바이트 남음

):\Portable\NodeJSPortable\Data\aann\start>■
```

// node cmd

md aann

cd aann

md start

cd start



4.2 Node project : npm init

```
npm WARN npm Supported releases of Node.js are the latest release of 4, 6, 7, 8, 9.  
npm WARN npm You can find the latest version at https://nodejs.org/  
This utility will walk you through creating a package.json file.  
It only covers the most common items, and tries to guess sensible defaults.
```

```
See 'npm help json' for definitive documentation on these fields  
and exactly what they do.
```

```
Use 'npm install <pkg>' afterwards to install a package and  
save it as a dependency in the package.json file.
```

```
Press ^C at any time to quit.
```

```
package name: (start)
```

```
version: (1.0.0)
```

```
description: start node project
```

```
entry point: (index.js)
```

```
test command:
```

```
git repository:
```

```
keywords: test
```

```
author: aa00
```

```
license: (ISC) MIT
```

```
About to write to D:\Portable\NodeJSPortable\Data\ann\start\package.json:
```

```
{  
  "name": "start",  
  "version": "1.0.0",  
  "description": "start node project",  
  "main": "index.js",  
  "scripts": {  
    "test": "echo \"Error: no test specified\" && exit 1"  
  },  
  "keywords": [  
    "test"  
  ],  
  "author": "aa00",  
  "license": "MIT"  
}
```

```
Is this OK? (yes) ■
```

// node project

npm init



4.3.1 Node project : package.json

```
cmd npm
D:\Portable\NodeJSPortable\Data\ann\start>dir
D 드라이브의 볼륨: DATA
볼륨 일련 번호: 7A01-106A

D:\Portable\NodeJSPortable\Data\ann\start 디렉터리

2018-09-03 오후 12:24 <DIR> .
2018-09-03 오후 12:24 <DIR>
2018-09-03 오후 12:24 255 package.json
1개 파일
2개 디렉터리 852,351,549,440 바이트 남음

D:\Portable\NodeJSPortable\Data\ann\start>
```




4.3.2 Node project : **package.json**

package.json

type **package.json**

Use "cat" when
"type" does not
work

```
cmd npm
D:\Portable\NodeJSPortable\Data\AAnn\start>cat package.json
{
  "name": "start",
  "version": "1.0.0",
  "description": "start node project",
  "main": "index.js",
  "scripts": {
    "test": "echo \"Error: no test specified\" && exit 1"
  },
  "keywords": [
    "test"
  ],
  "author": "aa00",
  "license": "MIT"
}
D:\Portable\NodeJSPortable\Data\AAnn\start>
```

Save as
AAnn_package.png



4.4 Node project : package.json

Sublime Text 3

Project > Add Folder to Project

Select folder: NodeJSPortable/Data/aann

D:\#Portable#NodeJSPortable#Data#aann#start#package.json (aa00, aann) - Sublime Text (UNREGISTERED)

File Edit Selection Find View Goto Tools Project Preferences Help

FOLDERS

- ▶ aa00
- ▼ aann
 - ▼ start
 - /* package.json

```
1 {  
2   "name": "start",  
3   "version": "1.0.0",  
4   "description": "start node project",  
5   "main": "index.js",  
6   "scripts": {  
7     "test": "echo \"Error: no test specified\" && exit 1"  
8   },  
9   "keywords": [  
10    "test"  
11  ],  
12   "author": "aa00",  
13   "license": "MIT"  
14 }  
15
```



5. Node Apps

Node Apps



5.1.1 Hello Node! – hello.js

The screenshot shows the Sublime Text editor interface. On the left, a 'FOLDERS' sidebar displays a project structure with folders 'aa00' and 'aann', and a sub-folder 'start'. A context menu is open over the 'start' folder, with 'New File' selected. The main editor window shows the file 'D:\Portable\NodeJS\Portable\Data\aa00\start\hello.js (aa00, aann) - Sublime Text (UNREGISTERED)'. The code in 'hello.js' is:

```
1 // hello.js
2 console.log("Hello Node! by AA00");
```

Below the code editor, the output console displays the result of running the script:

```
Hello Node! by AA00
[Finished in 0.2s]
```

Build system을 **Node**로 지정 후 **^B**로 실행



5.1.2 Hello Node! – “node hello.js”

Node cmd에서 “node hello” 로 실행

C:\ npm

D:\Portable\NodeJSPortable\Data\ann\start>dir

D 드라이브의 볼륨: DATA

볼륨 일련 번호: 7A01-106A

D:\Portable\NodeJSPortable\Data\ann\start 디렉터리

2018-09-03	오후 12:30	<DIR>	.
2018-09-03	오후 12:30	<DIR>	
2018-09-03	오후 12:36	48	hello.js
2018-09-03	오후 12:24	255	package.json
	2개 파일	303	바이트
	2개 디렉터리	852,355,149,824	바이트 남음

D:\Portable\NodeJSPortable\Data\ann\start>node hello

Hello Node! by AA00

D:\Portable\NodeJSPortable\Data\ann\start>

**// node cmd
node hello.js**



5.1.3 Hello Node! – npm start 로 실행

D:\Portable\NodeJS\Portable\Data\aa00\start\package.json (aa00, aann) - Sublime Text (UNREGISTERED)

File Edit Selection Find View Goto Tools Project Preferences Help

FOLDERS

aa00
aann
start
/* hello.js
/* package.json

```
1 {  
2   "name": "start",  
3   "version": "1.0.0",  
4   "description": "start node project",  
5   "main": "index.js",  
6   "scripts": {  
7     "start": "node hello.js",  
8     "test": "echo \"Error: no test specified\" && exit 1"  
9   },  
10  "keywords": [  
11    "test"  
12  ],  
13  "author": "aa00",  
14  "license": "MIT"  
15 }  
16
```

C:\ npm

D:\Portable\NodeJS\Portable\Data\aa00\start> npm start
npm WARN npm npm does not support Node.js v5.12.0

> start@1.0.0 start D:\Portable\NodeJS\Portable\Data\aa00\start
> node hello.js

Hello Node! by AA00



Using function in node



5.2.1 Using function in node

FOLDERS

- aa00
- aann
 - start
 - hello.js
 - hello_function.js**
 - package.json

package.json x

hello_function.js x

```
1 // hello_function.js
2 //console.log("Hello Node! by AA00");
3
4 function hello(what) {
5     console.log("Hello " + what + " !");
6 }
7
8 hello("World");
9 hello("aa00");
10
```

Hello World !
Hello aa00 !
[Finished in 0.2s]



5.2.2 Using module in node

```
FOLDERS
└─ aa00
  └─ aann
    └─ start
        /* hello.js
        /* hello_function.js
        /* hello_module.js
        /* package.json

package.json x hello_function.js x hello_call_module.js x hello_module.js x
1 // hello module.js
2 var util = require('util');
3
4 function hello(what) {
5     util.print("Hello " + what + " !\n");
6 }
7
8 hello("Node");
9 hello("aa00");
10
```

```
(node) util.print is deprecated. Use console.log instead.
Hello Node !
Hello aa00 !
[Finished in 0.2s]
```

```
// Using module in node.
var util = require('util');
```

https://nodejs.org/api/util.html#util_util_print



5.2.3 Using local module – hello_mymodule.js

FOLDERS

- aa00
 - aann
 - start
 - hello.js
 - hello_function.js
 - hello_module.js
 - hello_mymodule.js
 - package.json

hello_mymodule.js x

```
1 // hello_mymodule.js
2
3 module.exports = function(what) {
4     console.log("Hello " + what + " !");
5 }
6
```

사용자 정의 모듈

FOLDERS

- aa00
 - aann
 - start
 - hello.js
 - hello_call_module.js
 - hello_function.js
 - hello_module.js
 - hello_mymodule.js
 - package.json

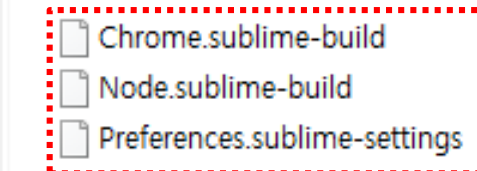
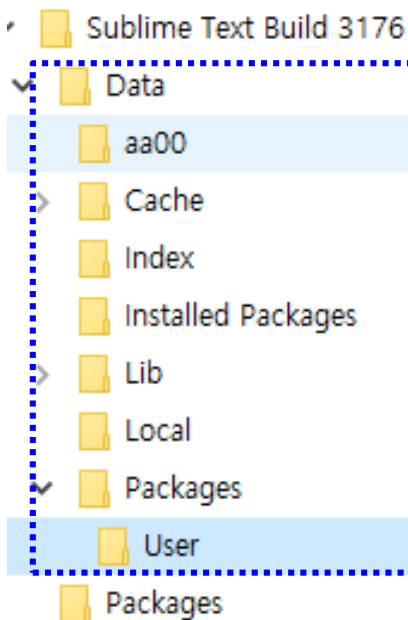
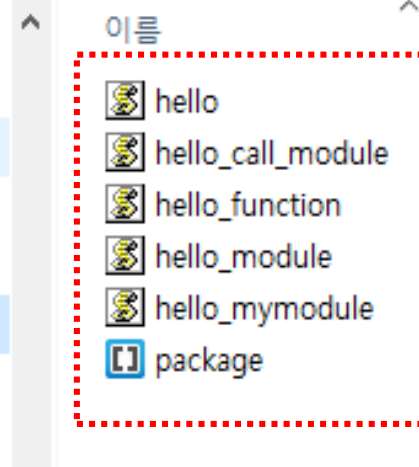
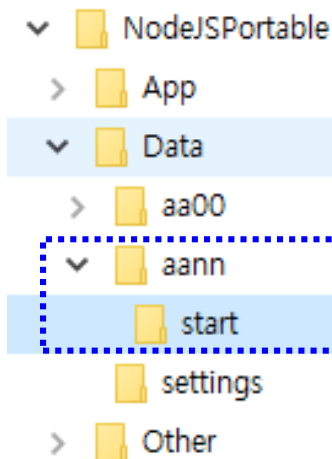
hello_mymodule.js x hello_call_module.js x

```
1 // hello_call_module.js
2 var olleh = require('./hello_mymodule.js');
3
4 olleh("Node");
5 olleh("aa00");
6
7
```

Hello Node !
Hello aa00 !
[Finished in 0.2s]

Call local module 'hello_mymodule.js' from hello_call_module.js

Checking – Portable working folders





[extra code] local module : **circle.js**

circle_info.js uses local module **circle.js**.

```
1 // circle.js
2 var PI = Math.PI;
3
4 module.exports.area = function (r) {
5     return PI * r * r;
6 };
7
8 module.exports.circumference = function (r) {
9     return 2 * PI * r;
10 };
```

circle.js



```
1 // circle_info.js
2 var circle = require('./circle.js');
3 console.log( 'The area of a circle of radius 4 is '
4     + circle.area(4).toFixed(2));
5 console.log( 'The circumference of a circle of radius 4 is '
6     + circle.circumference(4).toFixed(2));
```

circle_info.js

```
The area of a circle of radius 4 is 50.27
The circumference of a circle of radius 4 is 25.13
[Finished in 0.2s]
```



Node.js Server

1. http, tcp, file

2. Express



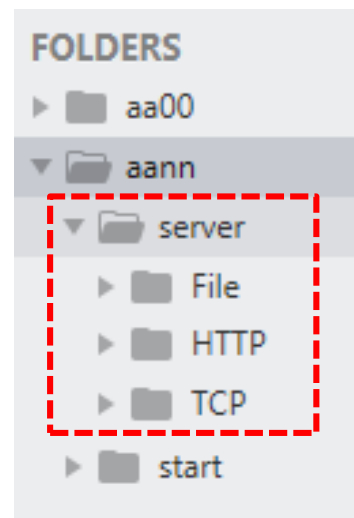
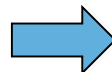
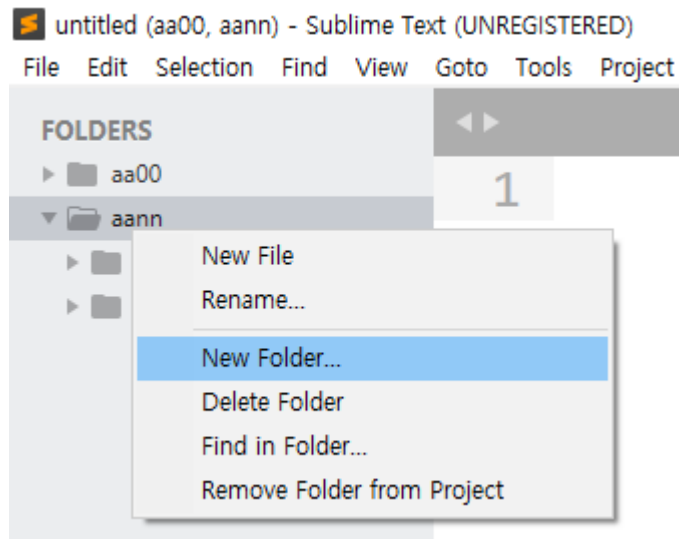
6. Node Server

Node Server I.

- 1. HTTP server**
- 2. TCP server**
- 3. File upload**



6.1 Node server : working folders





6.1.1 http server

D:\Portable\NodeJS\Portable\Data\Aann\server\HTTP\index.js (aa00, aann) - Sublime Text (UNREGISTERED)

File Edit Selection Find View Goto Tools Project Preferences Help

FOLDERS

- ▶ aa00
- ▼ aann
 - server
 - File
 - file_server.js
 - HTTP
 - index.js
 - TCP
 - client.js
 - server.js
 - start

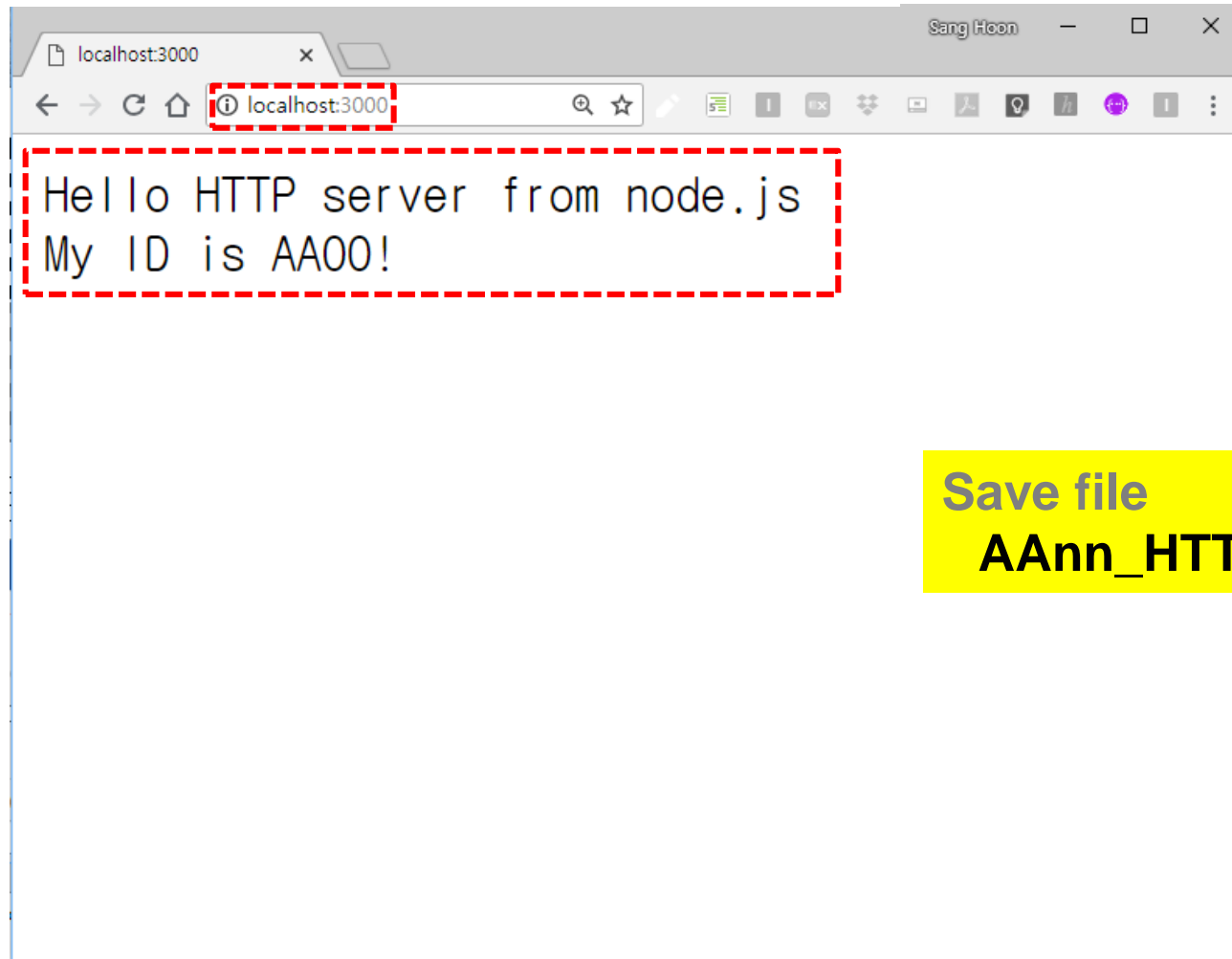
```
1 // http server : index.js
2
3 var http = require('http');
4 port = 3000;
5
6 var server = http.createServer(function(request, response) {
7     response.writeHead(200, {
8         "Content-Type": "text/plain"
9     });
10    response.write("Hello HTTP server from node.js"); // WEB response
11    response.write("\nMy ID is AA00!");
12    response.end();
13
14 });
15
16 server.listen(port);
17 console.log("Server Running on " + port +
18     ".\nLaunch http://localhost:" + port);
19
```

```
Server Running on 3000.
Launch http://localhost:3000
```



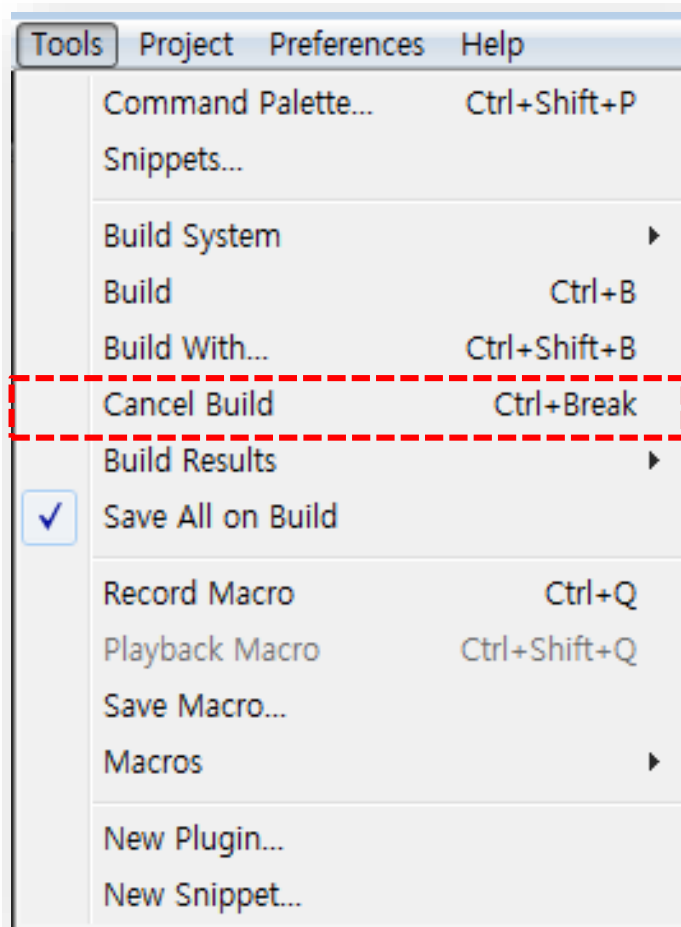

6.1.2 http server : result 1

Server Running on 3000.
Launch `http://localhost:3000`



Save file
AAnn_HTTP.png

6.1.3 http server – stop server !!!



```
Server Running on 3000.  
Launch http://localhost:3000  
[Cancelled]
```

[Tip] port number

★사용해도 되는 포트번호와 사용할 수 없는 포트 번호

1. 잘 알려진 포트는 0~1023 까지입니다.

(특정 프로그램들이 사용하기로 예약되어 있기 때문에 쓸 수 없는 포트 번호)

2. 등록된 포트는 1024~49151 까지입니다. (사용가능)

3. 동적 및/또는 개인 포트는 49152~65535 까지입니다. (사용가능)

참고: <http://support.microsoft.com/kb/174904/ko>

[Tip] listen EADDRINUSE 오류 해결 -1

1. listen **EADDRINUSE** 오류

-사용중인 포트이거나 포트를 중지시키지 않고 종료시켰을 경우 계속 포트가 사용되고 있는데 연결 시키려고 할 때 나타나는 오류

```
Server Running on 3000.  
Launch http://localhost:3000  
events.js:154  
    throw er; // Unhandled 'error' event  
    ^  
  
Error: listen EADDRINUSE :::3000  
    at Object.exports._errnoException (util.js:856:11)  
    at exports._exceptionWithHostPort (util.js:879:20)
```

2. 해결 방법

- (1) cmd창에서 **netstat -ano**를 입력한 후, 로컬주소에서 사용 중인 포트 번호를 확인
- (2) 사용중인 포트번호를 확인하고 그 해당포트의 **pid번호를 확인**한다.

[Tip] listen EADDRINUSE 오류 해결 -2

```
Node
v5.7.0
D:\Portable\nodejs\portable\data>netstat -ano

활성 연결

프로토콜  로컬 주소          외부 주소          상태          PID
TCP        0.0.0.0:135     0.0.0.0:0          LISTENING      1040
TCP        0.0.0.0:445     0.0.0.0:0          LISTENING      4
TCP        0.0.0.0:3000    0.0.0.0:0          LISTENING      14332
TCP        0.0.0.0:14430   0.0.0.0:0          LISTENING      24316
TCP        0.0.0.0:14440   0.0.0.0:0          LISTENING      24316
TCP        0.0.0.0:17500   0.0.0.0:0          LISTENING      25096
TCP        0.0.0.0:21300   0.0.0.0:0          LISTENING      16228
TCP        0.0.0.0:30403   0.0.0.0:0          LISTENING      3660
TCP        0.0.0.0:30409   0.0.0.0:0          LISTENING      3668
```

2. 해결 방법 (cmd에서 다음 명령 실행 후 port 3000의 pid가 제거됨을 확인) **taskkill /pid PID_number**

```
D:\Portable\nodejs\portable\data>taskkill /pid 14332
성공: 프로세스(PID 14332)에 종료 신호를 보냈습니다.
```

```
D:\Portable\nodejs\portable\data>netstat -ano
```

활성 연결

프로토콜	로컬 주소	외부 주소	상태	PID
TCP	0.0.0.0:135	0.0.0.0:0	LISTENING	1040
TCP	0.0.0.0:445	0.0.0.0:0	LISTENING	4
TCP	0.0.0.0:14430	0.0.0.0:0	LISTENING	24316



6.2.1 tcp server (socket connection)

FOLDERS

- ▶ aa00
- ▼ aann
 - ▶ server
 - ▶ File
 - ▶ HTTP
 - /* index.js
 - ▶ TCP
 - /* client.js
 - /* server.js
 - ▶ start

```
1 // tcp server (network server)
2 var net = require('net');
3 var port = 3000;
4
5 // Network connection using socket
6 var server = net.createServer(function(socket) {
7     console.log("Connection from " + socket.remoteAddress);
8     socket.end("Hello AA00! from localhost:3000");
9 });
10
11 server.listen(port, "127.0.0.1");
12 console.log("Network server started at port : " + port);
13
```

Socket으로 전송

Network server started at port : 3000



6.2.2 tcp server [Node cmd : node server.js]

```
cmd npm - node server
```

```
D:\Portable\NodeJSPortable\Data\ann\start>cd ..
```

```
D:\Portable\NodeJSPortable\Data\ann>cd server
```

```
D:\Portable\NodeJSPortable\Data\ann\server>cd tcp
```

```
D:\Portable\NodeJSPortable\Data\ann\server\tcp>dir
```

```
D 드라이브의 볼륨: DATA  
볼륨 일련 번호: 7A01-106A
```

```
D:\Portable\NodeJSPortable\Data\ann\server\tcp 디렉터리
```

```
2018-09-03 오후 04:33 <DIR> .  
2018-09-03 오후 04:33 <DIR> ..  
2018-03-14 오후 03:26 419 client.js  
2018-09-03 오후 04:53 372 server.js  
2개 파일 791 바이트  
2개 디렉터리 852,353,978,368 바이트 남음
```

```
D:\Portable\NodeJSPortable\Data\ann\server\tcp>node server  
Network server started at port : 3000
```

**Node cmd에서 TCP
서버 실행**

TCP 폴더로 가서

node server

[주의]

**Sublime text3에서
반드시 “Cancel Build”**

6.2.3 tcp client

```

FOLDERS
  aa00
  aann
    server
      File
      HTTP
        index.js
      TCP
        client.js
        server.js
    start

server.js  x  client.js  x
1  // tcp client
2  var net = require('net');
3  var port = 3000;
4  var client = new net.Socket();
5
6  // Connection using socket
7  client.connect(port, "127.0.0.1");
8
9  // Receive data from socket
10 client.on('data', function (data) {
11     console.log('Data: ' + data);
12     client.destroy();
13 });
14
15 // Add a 'close' event handler for the client socket
16 client.on('close', function () {
17     console.log('Connection closed');
18 });
19

```

Socket으로 전송되는 데이터를 처리하고 종료

```

Data: Hello AA00! from localhost:3000
Connection closed
[Finished in 0.3s]

```




6.2.4 tcp server 정지 (^C) 후 재 실행!

```
C:\> npm - node server
```

```
D:\Portable\NodeJSPortable\Data\ann\server\TCP>node server
```

```
Network server started at port : 3000
```

```
Connection from 127.0.0.1
```

```
^C
```


```
D:\Portable\NodeJSPortable\Data\ann\server\TCP>node server
```

```
Network server started at port : 3000
```



6.2.5 tcp server & client : result

(A)

 npm - node server

Node cmd


```
D:\Portable\NodeJSPortable\Data\ann\server\TCP>node server  
Network server started at port : 3000
```

(B)

```
Data: Hello AA00! from localhost:3000  
Connection closed  
[Finished in 0.4s]
```

**Sublime
Text 3**

(C)

 npm - node server

```
D:\Portable\NodeJSPortable\Data\ann\server\TCP>node server  
Network server started at port : 3000  
Connection from 127.0.0.1  
Connection from 127.0.0.1  
Connection from 127.0.0.1  
Connection from 127.0.0.1
```

Save file

AAnn_TCP_Log.png



6.3.1 file upload using module 'formidable'

FOLDERS

- aa00
- aann
 - server
 - File
 - node_modules
 - /* file_server.js
 - /* package-lock.json
 - HTTP
 - /* index.js
 - TCP
 - /* client.js
 - /* server.js
 - start

```
1 // File upload using formidable node module
2 var formidable = require('formidable'),
3     http = require('http'),
4     util = require('util'),
5     port = 3663;
6
7 http.createServer(function(req, res) {
8   if (req.url == '/upload' && req.method.toLowerCase() == 'post') {
9     // parse a file upload
10    var form = new formidable.IncomingForm();
11
12    form.parse(req, function(err, fields, files) {
13      res.writeHead(200, {'content-type': 'text/plain'});
14      res.write('received upload:\n\n');
15      res.end(util.inspect({fields: fields, files: files}));
16    });
17    return;
18  }
19  // show a file upload form
20  res.writeHead(200, {'content-type': 'text/html'});
21  res.end(
22    '<form action="/upload" enctype="multipart/form-data" method="post">'+
23    '<input type="text" name="title"><br>'+
24    '<input type="file" name="upload" multiple="multiple"><br>'+
```

File server Running on 3663.

Launch <http://localhost:3663>



6.3.2 file upload : npm install formidable

```
npm
D:\Portable\NodeJSPortable\Data\ann\server>cd file
D:\Portable\NodeJSPortable\Data\ann\server\File>dir
D 드라이브의 볼륨: DATA
볼륨 일련 번호: 7A01-106A

D:\Portable\NodeJSPortable\Data\ann\server\File 디렉터리

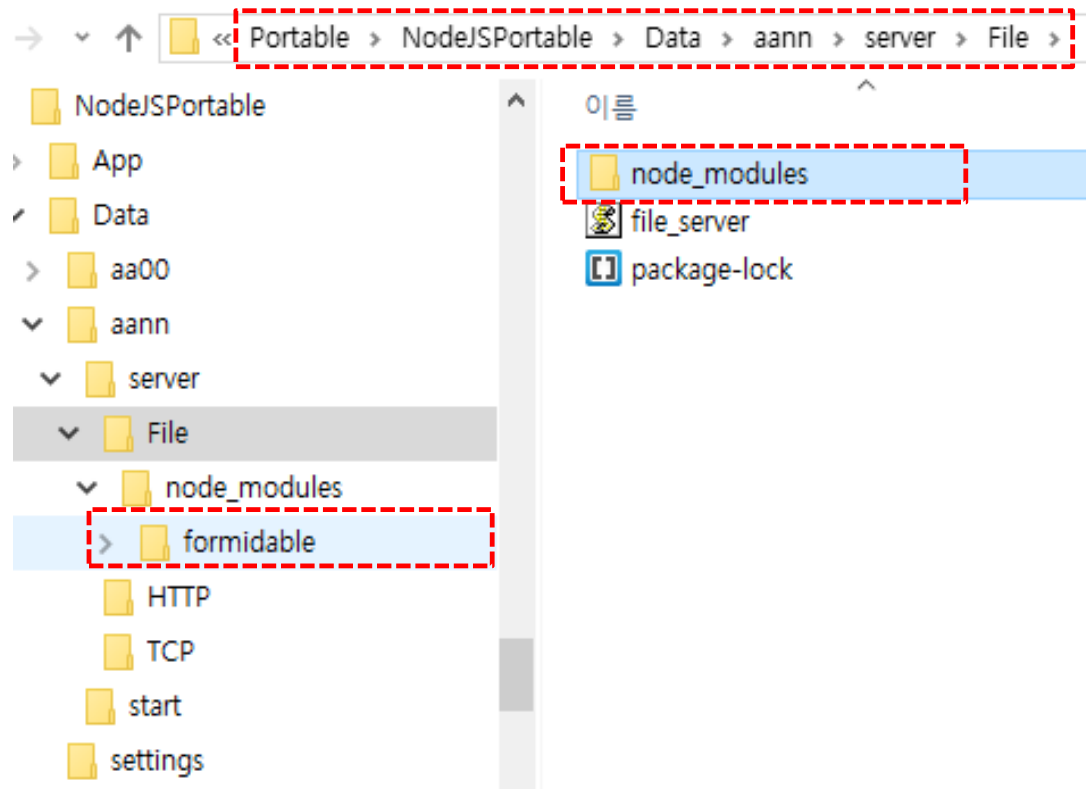
2018-09-03 오후 04:33 <DIR>          .
2018-09-03 오후 04:33 <DIR>          ..
2017-12-29 오후 05:21                1,048 file_server.js
                1개 파일                1,048 바이트
                2개 디렉터리 852,353,654,784 바이트 남음

D:\Portable\NodeJSPortable\Data\ann\server\File>npm install formidable
npm WARN npm npm does not support Node.js v5.12.0
npm WARN npm You should probably upgrade to a newer version of node as we
npm WARN npm can't make any promises that npm will work with this version.
npm WARN npm Supported releases of Node.js are the latest release of 4, 6, 7, 8, 9.
npm WARN npm You can find the latest version at https://nodejs.org/
npm WARN npm npm does not support Node.js v5.12.0
npm WARN npm You should probably upgrade to a newer version of node as we
npm WARN npm can't make any promises that npm will work with this version.
npm WARN npm Supported releases of Node.js are the latest release of 4, 6, 7, 8, 9.
npm WARN npm You can find the latest version at https://nodejs.org/
npm WARN saveError ENOENT: no such file or directory, open 'D:\Portable\NodeJSPortable\Data\ann\server\File\package.json'
npm notice created a lockfile as package-lock.json. You should commit this file.
npm WARN enoent ENOENT: no such file or directory, open 'D:\Portable\NodeJSPortable\Data\ann\server\File\package.json'
npm WARN File No description
npm WARN File No repository field.
npm WARN File No README data
npm WARN File No license field.

+ formidable@1.2.1
added 1 package in 1.423s

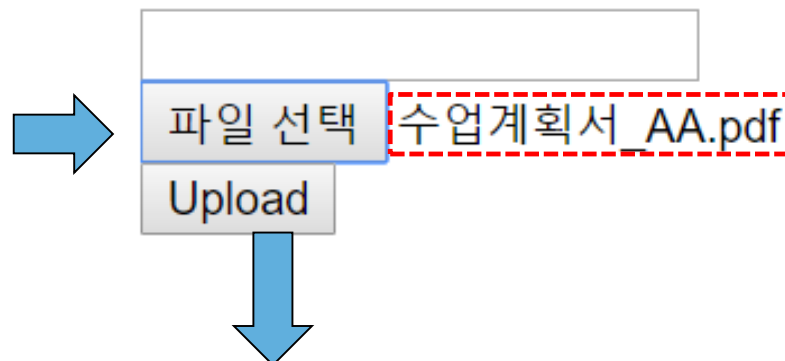
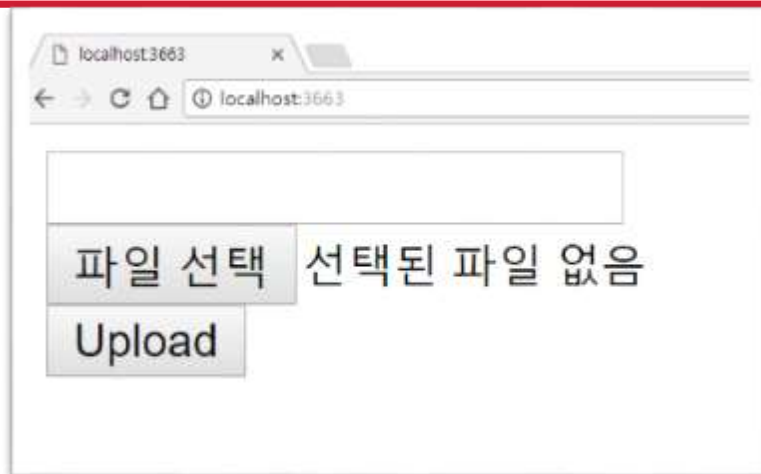
D:\Portable\NodeJSPortable\Data\ann\server\File>
```

6.3.3 file upload : npm install formidable



**Portable node.js에서는
외부 node module이
node_modules에 저장된다.**

6.3.4 file upload



← → ↻ ⬆ ⓘ localhost:3663/upload 🔍 ☆

received upload:

```
{ fields: { title: '' },
  files:
    { upload:
      File {
        domain: null,
        _events: {},
        _eventsCount: 0,
        _maxListeners: undefined,
        size: 96305,
        path: 'C:\\\\Users\\YISH-H-1\\AppData\\Local\\Temp\\upload_81600170265e8c598bbf860de52cac52',
        name: '&#49688;&#50629;&#44228;&#54925;&#49436;_AA.pdf',
        type: 'application/pdf',
        hash: null,
        lastModifiedDate: 2019-09-10T06:12:53.058Z,
        _writeStream: [Object] } } }
```

Save file
AAnn_Upload.png



[Practice]

◆ [wk02]

- Node module : **aanninfo.js**
- Upload folder: **AAnn_Rpt02**



[practice] local module : aanninfo.js

index_aann.js uses local module **aanninfo.js** in start subfolder.

```
1 // index_aann.js
2
3 var myinfo = require('./aanninfo');
4
5 myinfo("aa00", "Redwoods", '010-1234-5678');
6
7 myinfo("aa55", "Comsi", '010-5678-1234');
```

My Info
ID : aa00
Name : Redwoods
Phone : 010-1234-5678

My Info
ID : aa55
Name : Comsi
Phone : 010-5678-1234

[Finished in 0.2s]

Save as
AAnn_info.png

[practice] local module : aanninfo.js

How to make aanninfo.js in start subfolder.

1. **Make local module – aanninfo.js**
2. **Call aanninfo.js from index_aann.js.**
3. **Capture your result.**

```

1 // aanninfo.js
2
3 module.exports = function(id, name, phone) {
4     console.log("My Info");
5     console.log("ID : " + id);
6     console.log("Name : " + name);
7     console.log("Phone : " + phone + "\n");
8 }
  
```

[\[참고\] Node local module 만들기](#)

◆ [Target of this week]

My Info using node module – aanninfo.js

Upload folder : AAnn_Rpt02

- 제출할 파일들

- ① **AAnn_package.png**
- ② **AAnn_HTTP.png**
- ③ **AAnn_TCP_Log.png**
- ④ **AAnn_Upload.png**
- ⑤ **AAnn_info.png**
- ⑥ **aanninfo.js**
- ⑦ **index_aann.js**

[Upload to github]

◆ [wk02]

- upload all work of this week
- Use repo “aann” in github
- upload folder “aann_rpt02” in your github.

● References & good sites

- ✓ <http://www.arduino.cc> Arduino Homepage
- ✓ <http://www.nodejs.org/ko> Node.js
- ✓ <https://plot.ly/> plotly
- ✓ <https://www.mongodb.com/> MongoDB
- ✓ <http://www.w3schools.com> By w3schools
- ✓ <http://www.github.com> GitHub



주교재 및 참고도서

아두이노와 Node.js에 기반한 IOT 신호 시각화

| 저자 이 상 훈 |

인제대학교 출판부

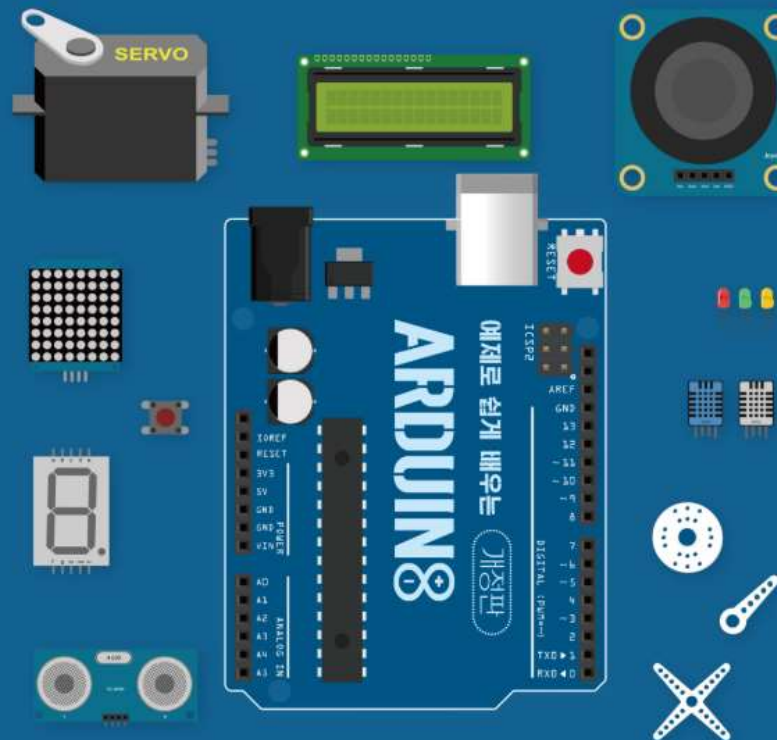
아두이노와 Node.js에 기반한

IOT 신호 시각화

| 저자 이 상 훈 |



인제대학교 출판부



예제로 쉽게 배우는

아두이노

개정판

장성용 · 김진환 지음

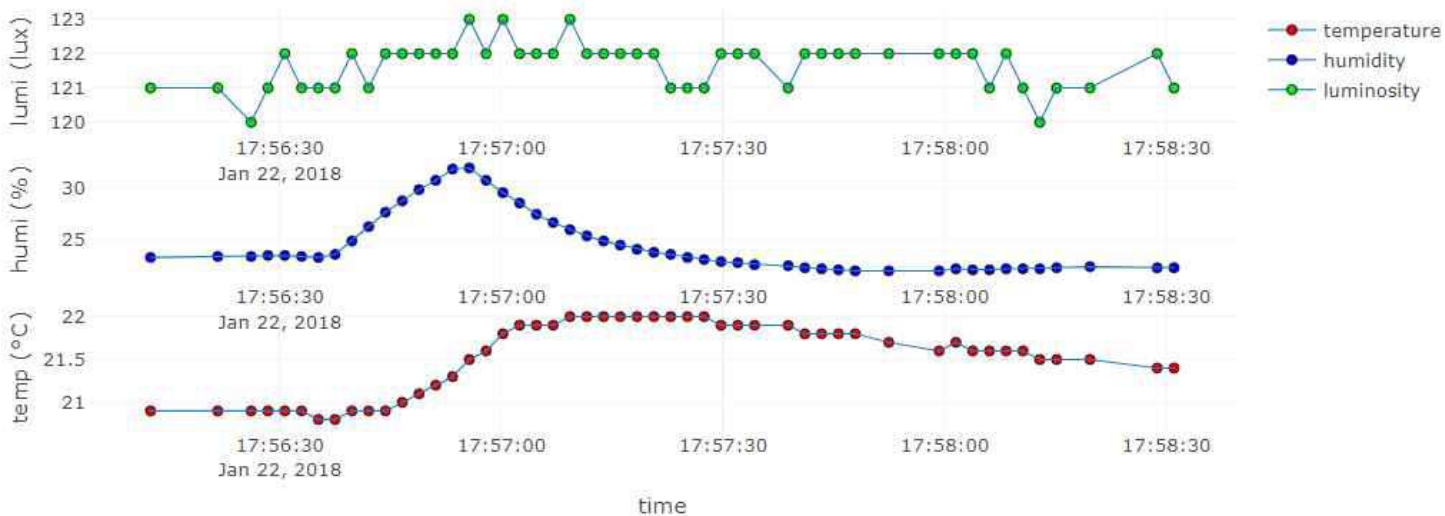


Target of this class

Real-time Weather Station from sensors



on Time: 2018-01-22 17:58:31.012



Another target of this class

PPG with rangeslider

