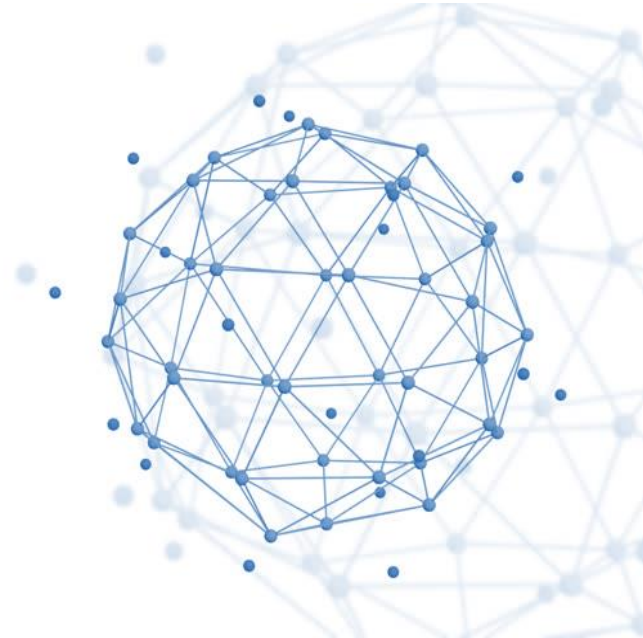


# MQTT Programming 2

**2021.05.06**

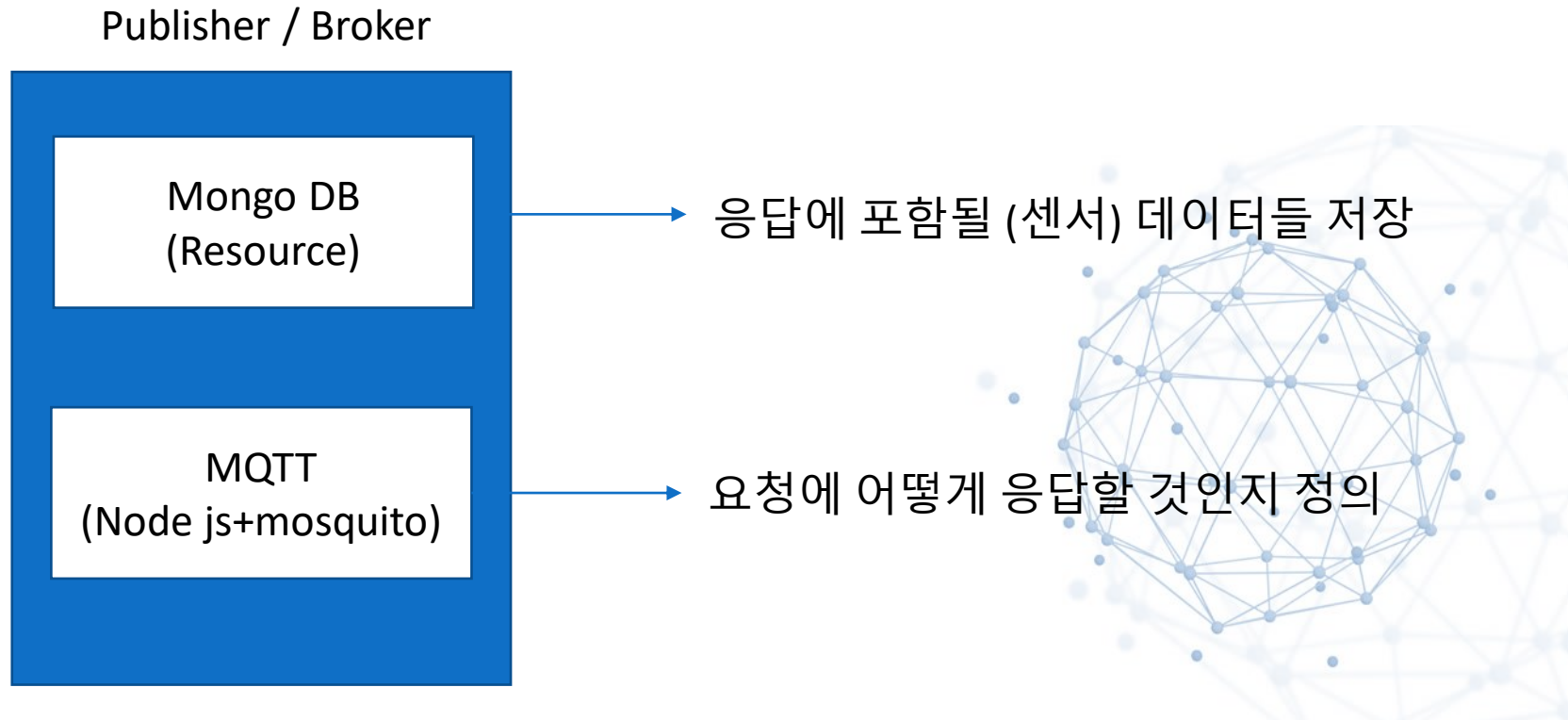
**Sang-woo Lee**

**glutton.leesw@gmail.com**



# Contents

- Node.js Express Project 생성 및 구동
- MongoDB 설치 및 구동



# Node.js Express Project 생성 및 구동

- Node.js Express Project 생성

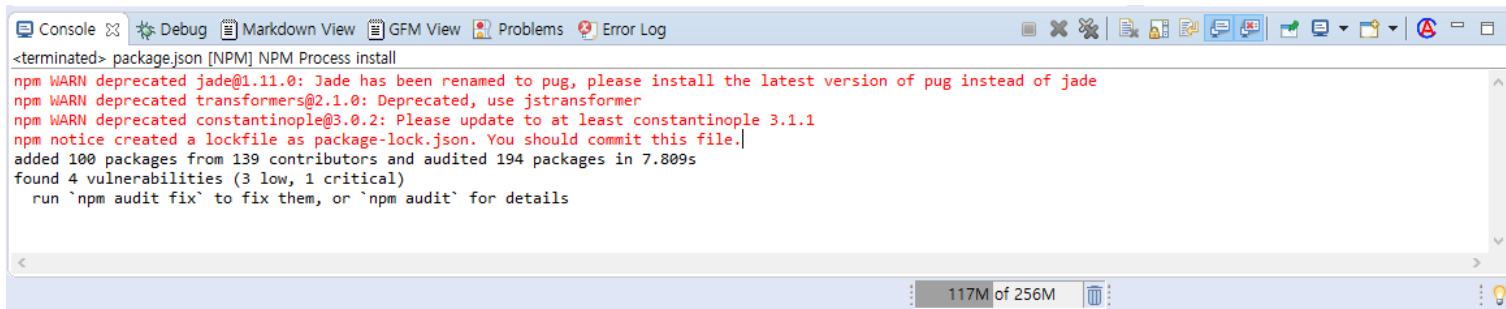
- File → New → Node.js Express Project → IoTServer 프로젝트 생성

The screenshot illustrates the process of creating a Node.js Express project in the Eclipse IDE. On the left, the 'File' menu is open, and 'New' is selected, leading to the 'Node.js Express Project' option, which is highlighted with a red box. A large yellow arrow points from this menu item to the 'New Express Project' dialog box on the right. In the dialog, the 'Project name' is set to 'IoTServer' (highlighted with a red box). The 'Use default location' checkbox is checked. The 'Template Engine' is set to 'Jade' (highlighted with a red box), and the 'Stylesheet Engine' is set to 'CSS' (also highlighted with a red box). To the right of the dialog, a tree view shows the project structure for 'IoTServer', including folders like 'bin', 'public', 'routes', and 'views', and files like 'index.js', 'users.js', 'error.jade', 'index.jade', 'layout.jade', 'app.js', 'package.json', and 'README.md'. The 'package.json' file is highlighted with a red box. At the bottom right, the text 'Node.js Express 프로젝트 구조' (Node.js Express Project Structure) is written in red.

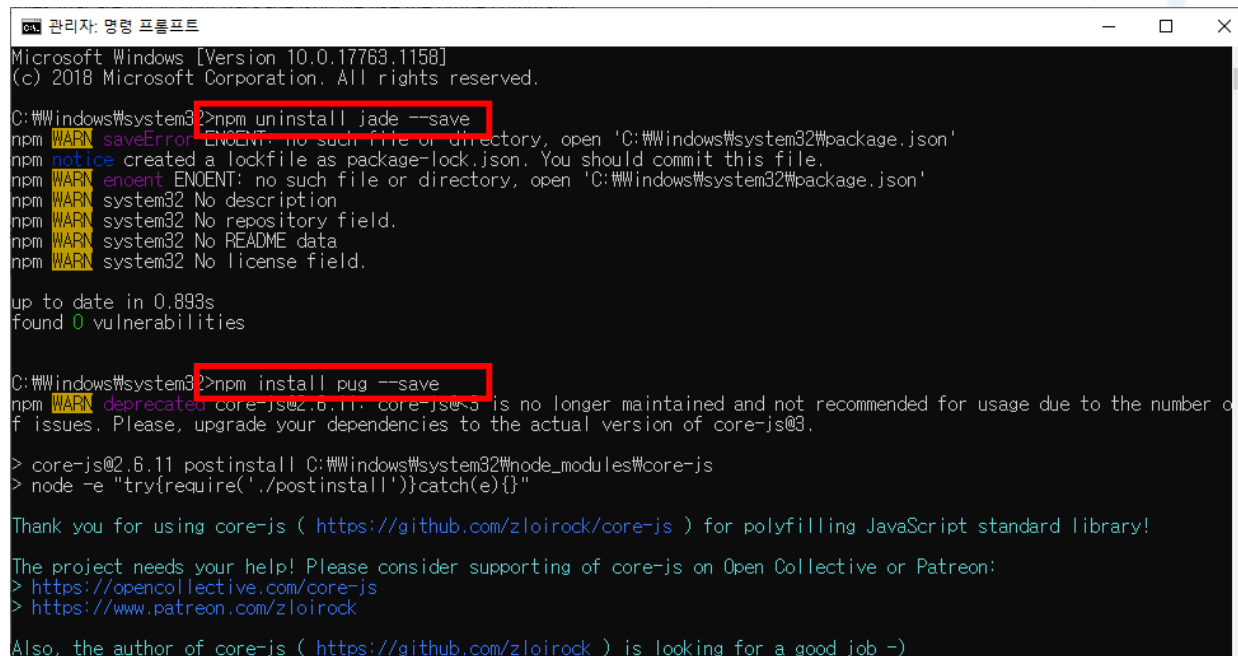
# Node.js Express Project 생성 및 구동

- Node.js Express Project 생성

- IoTServer 프로젝트 생성 후, 아래와 같은 오류 발생 시, jade를 pug로 업데이트
- CMD 실행 → `npm uninstall jade --save` 입력 → `npm install pug --save` 입력



```
<terminated> package.json [NPM] NPM Process install
npm WARN deprecated jade@1.11.0: Jade has been renamed to pug, please install the latest version of pug instead of jade
npm WARN deprecated transformers@2.1.0: Deprecated, use jstransformer
npm WARN deprecated constantinople@3.0.2: Please update to at least constantinople 3.1.1
npm notice created a lockfile as package-lock.json. You should commit this file.
added 100 packages from 139 contributors and audited 194 packages in 7.809s
found 4 vulnerabilities (3 low, 1 critical)
  run `npm audit fix` to fix them, or `npm audit` for details
```



```
관리자: 명령 프롬프트
Microsoft Windows [Version 10.0.17763.1158]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Windows\system32>npm uninstall jade --save
npm WARN saveError ENOENT: no such file or directory, open 'C:\Windows\system32\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 'C:\Windows\system32\package.json'
npm WARN system32 No description
npm WARN system32 No repository field.
npm WARN system32 No README data
npm WARN system32 No license field.

up to date in 0.893s
found 0 vulnerabilities

C:\Windows\system32>npm install pug --save
npm WARN deprecated core-js@2.6.11: core-js@3 is no longer maintained and not recommended for usage due to the number of issues. Please, upgrade your dependencies to the actual version of core-js@3.

> core-js@2.6.11 postinstall C:\Windows\system32\node_modules\core-js
> node -e "try{require('./postinstall')}catch(e){}"

Thank you for using core-js ( https://github.com/zloirock/core-js ) for polyfilling JavaScript standard library!

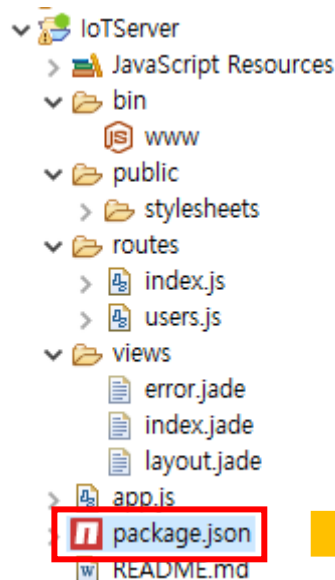
The project needs your help! Please consider supporting of core-js on Open Collective or Patreon:
> https://opencollective.com/core-js
> https://www.patreon.com/zloirock

Also, the author of core-js ( https://github.com/zloirock ) is looking for a good job -)
```

# Node.js Express Project 생성 및 구동

- Package 설치

- MQTT, MongoDB, socket 모듈 설치
- Eclipse 왼쪽의 Project Explorer에서 IoTServer 프로젝트의 package.json의 dependencies 확인
- dependencies의 맨 아래에 세 가지 패키지를 추가로 입력함
- "mqtt": "^2.14.0", "mongodb": "^2.2.33", "socket.io": "^2.0.4"



```
package.json
1 {
2   "name": "iotserver",
3   "version": "0.0.0",
4   "private": true,
5   "scripts": {
6     "start": "node ./bin/www"
7   },
8   "dependencies": {
9     "cookie-parser": "~1.4.4",
10    "debug": "~2.6.9",
11    "express": "~4.16.1",
12    "http-errors": "~1.6.3",
13    "jade": "~1.11.0",
14    "morgan": "~1.9.1"
15  }
16 }
17
```

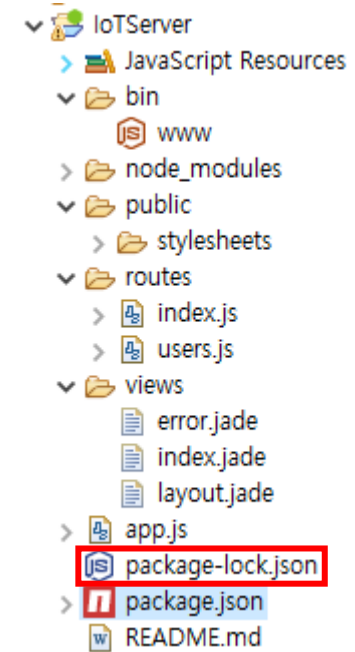
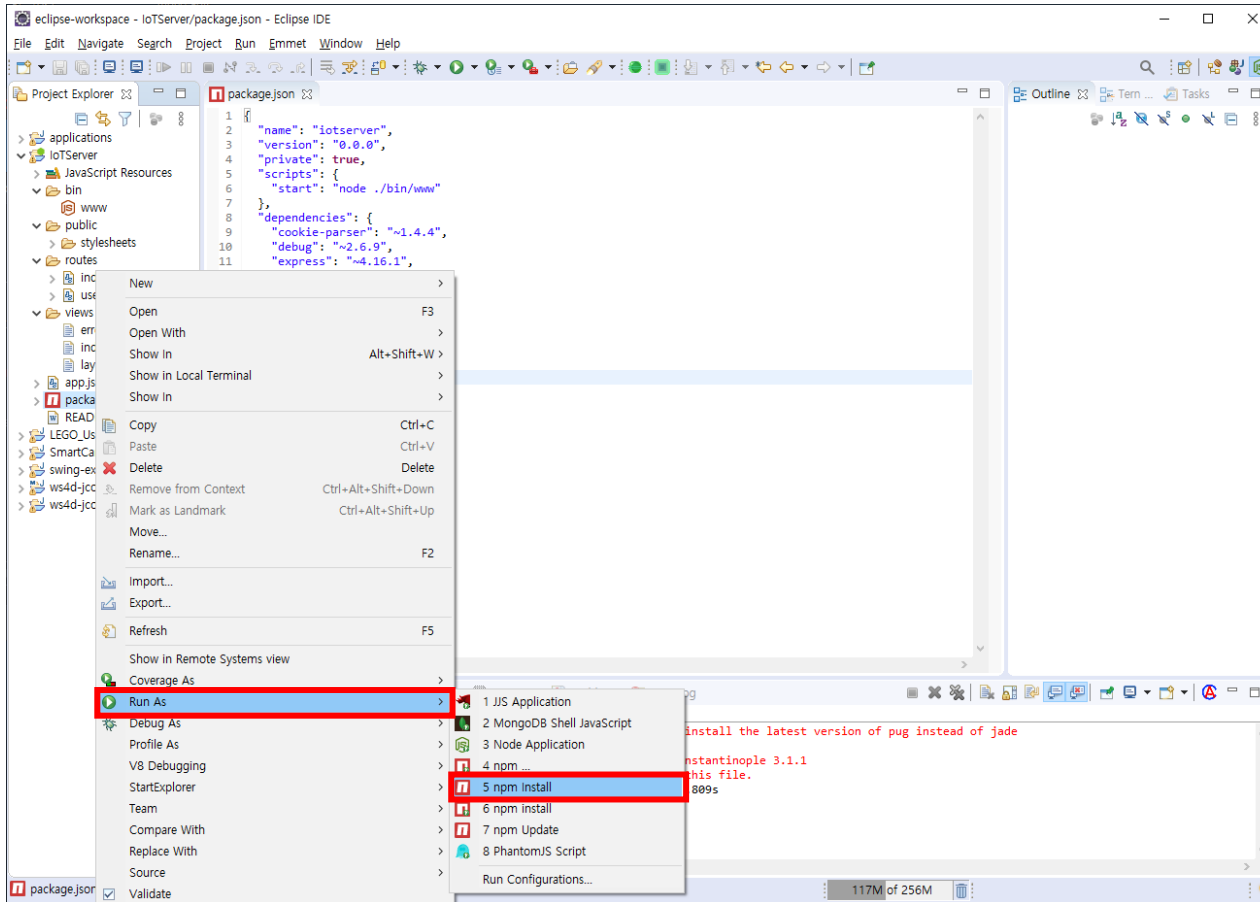
```
package.json
1 {
2   "name": "iotserver",
3   "version": "0.0.0",
4   "private": true,
5   "scripts": {
6     "start": "node ./bin/www"
7   },
8   "dependencies": {
9     "cookie-parser": "~1.4.4",
10    "debug": "~2.6.9",
11    "express": "~4.16.1",
12    "http-errors": "~1.6.3",
13    "jade": "~1.11.0",
14    "morgan": "~1.9.1",
15    "mqtt": "^2.14.0",
16    "mongodb": "^2.2.33",
17    "socket.io": "^2.0.4"
18  }
19 }
20
```

(coma) 및 버전 번호 유의하여 입력

# Node.js Express Project 생성 및 구동

- Package 설치

- package.json 마우스 우클릭 → Run As → npm install (MQTT 통신을 위한 패키지 설치 완료)



**Npm install 이후, Project Explorer에 package-lock.json 파일이 생성된 경우 package-lock.json 파일을 삭제하고 다시 npm install을 수행함**

# Node.js Express Project 생성 및 구동

- Package 설치

- 다시 npm install을 수행한 이후에도 package-lock.json이 생성되었다면 아래의 절차를 수행함
- 명령프롬프트 (cmd) 실행 후, 세 개의 명령어 입력
- Set EXPO\_DEBUG=true
- npm config set package-lock false
- npm install

관리자: 명령 프롬프트

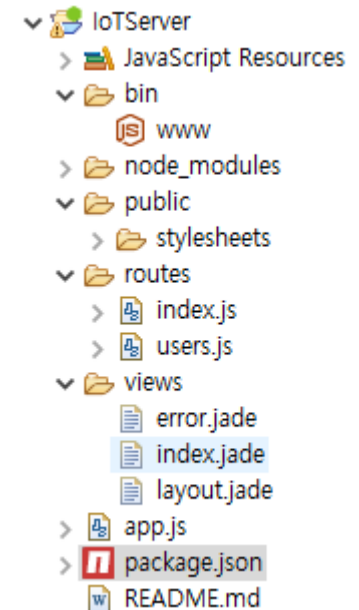
```
C:\Windows\system32>Set EXPO_DEBUG=true
C:\Windows\system32>npm config set package-lock false
C:\Windows\system32>npm install
npm WARN saveError ENOENT: no such file or directory, open 'C:\Windows\system32\package.json'
npm WARN enoent ENOENT: no such file or directory, open 'C:\Windows\system32\package.json'
npm WARN system32 No description
npm WARN system32 No repository field.
npm WARN system32 No README data
npm WARN system32 No license field.

audited 379 packages in 1.066s

2 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities

C:\Windows\system32>_
```



이후 package.json에 대해 다시 npm install 수행

package-lock.json이 생성되지 않았음을 확인

# Node.js Express Project 생성 및 구동

- Server 구동 및 테스트

- bin 폴더 아래의 www 우클릭 → Run As → Node Application → 서버 실행 완료

**3000번 포트 개방 (웹 서버 실행)**

**웹 서버 실행**

**1 Node Application**

**Console**

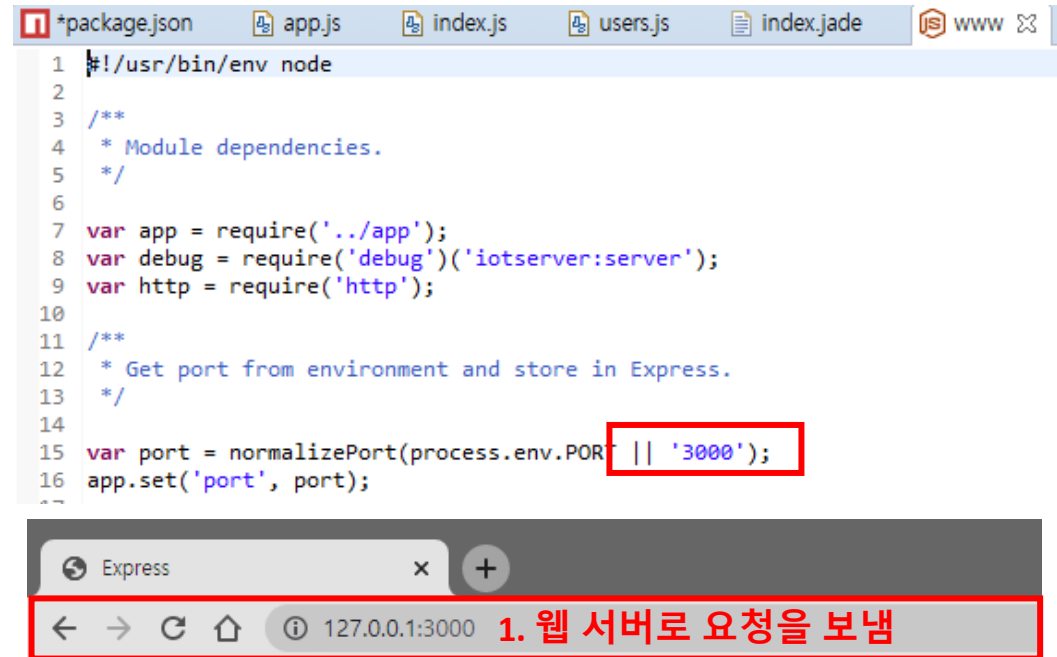
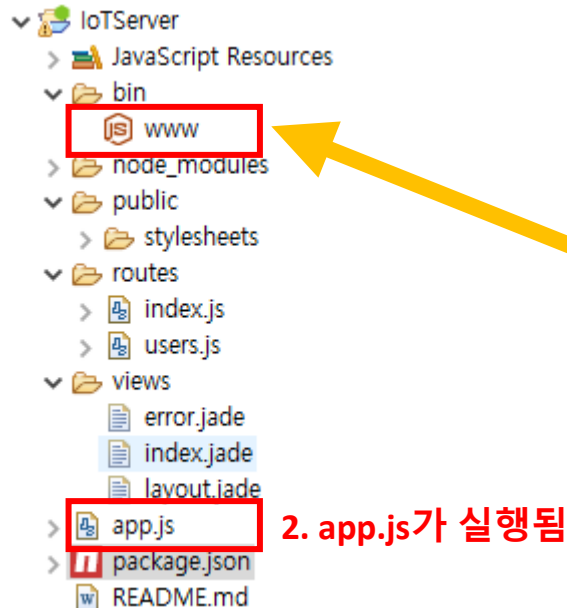
```
IoTServer-bin-www [Node Application] Node.js Process
GET / 200 2281.540 ms - 170
GET /stylesheets/style.css 200 53.597 ms - 111
GET /favicon.ico 404 19.107 ms - 1292
```



# Node.js Express Project 생성 및 구동

- Server 구동 및 테스트

- 이후, 브라우저를 열어 실행된 웹 서버에 요청을 보냄 (즉, 열려있는 3000번 포트에 요청을 보냄)
- 주소창에 localhost 주소와 포트번호를 적어 node.js의 정보를 보기 위해 요청을 보냄
- 127.0.0.1:3000/



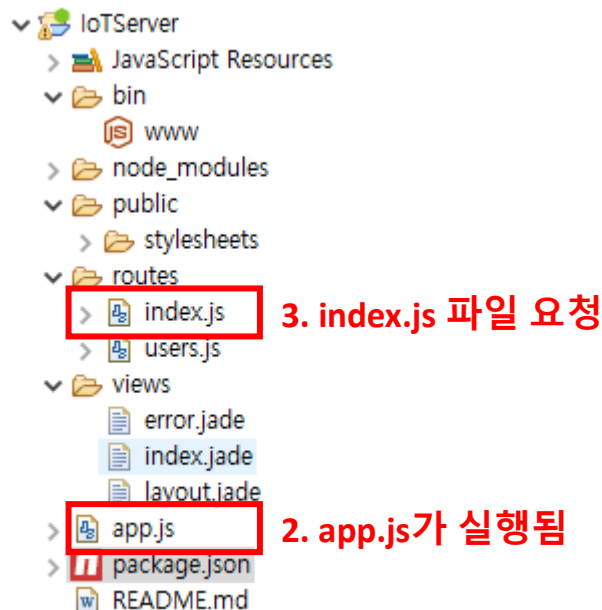
Express

Welcome to Express

# Node.js Express Project 생성 및 구동

- Server 구동 및 테스트

- 127.0.0.1:3000 뒤에는 '/'가 생략되어 있음 ('/'는 root를 의미함)
- app.js 에서 '/' 를 처리하는 router 파일 확인 가능 → indexRouter
- indexRouter는 routes 폴더의 index.js 파일을 가리킴 (즉, 이 파일을 요청하는 것)

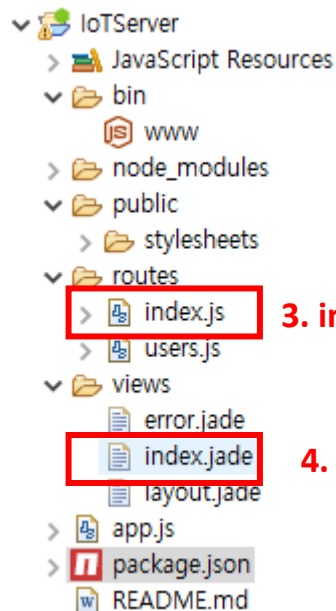


```
package.json app.js ✕
1 var createError = require('http-errors');
2 var express = require('express');
3 var path = require('path');
4 var cookieParser = require('cookie-parser');
5 var logger = require('morgan');
6
7 var indexRouter = require('./routes/index');
8 var usersRouter = require('./routes/users');
9
10 var app = express();
11
12 // view engine setup
13 app.set('views', path.join(__dirname, 'views'));
14 app.set('view engine', 'jade');
15
16 app.use(logger('dev'));
17 app.use(express.json());
18 app.use(express.urlencoded({ extended: false }));
19 app.use(cookieParser());
20 app.use(express.static(path.join(__dirname, 'public')));
21
22 app.use('/', indexRouter);
23 app.use('/users', usersRouter);
24
25 // catch 404 and forward to error handler
26 app.use(function(req, res, next) {
27   next(createError(404));
28 });
29
```

# Node.js Express Project 생성 및 구동

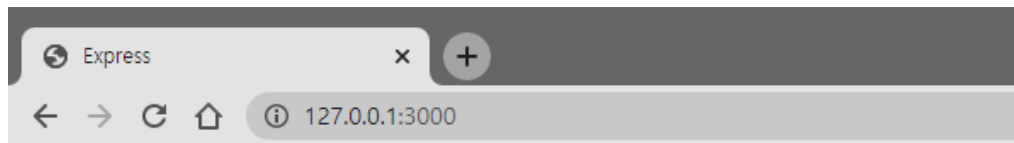
- Server 구동 및 테스트

- Index.js는 index.jade에 요청을 보내 웹페이지 화면에 Express Welcome to Express를 띄워줌



3. index.js 파일 요청

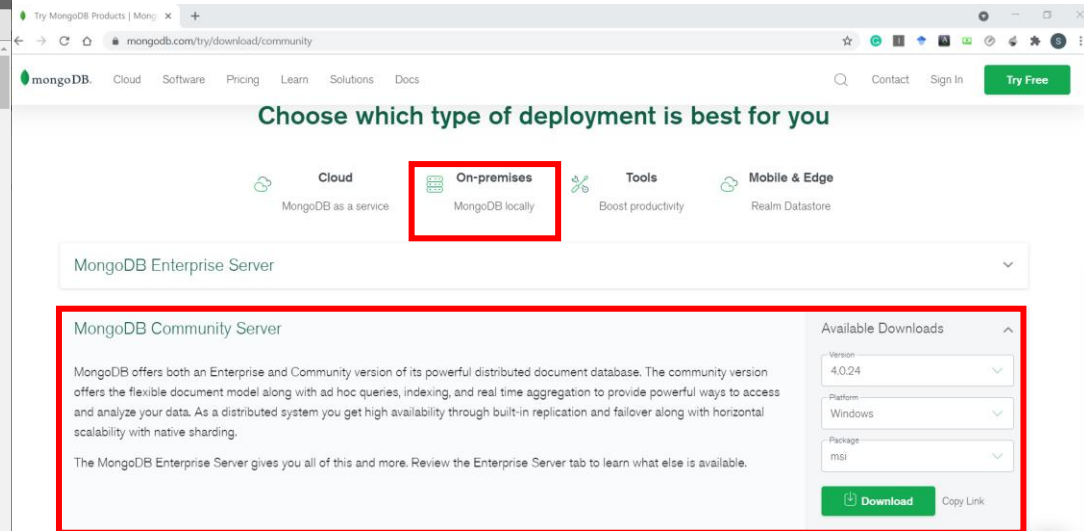
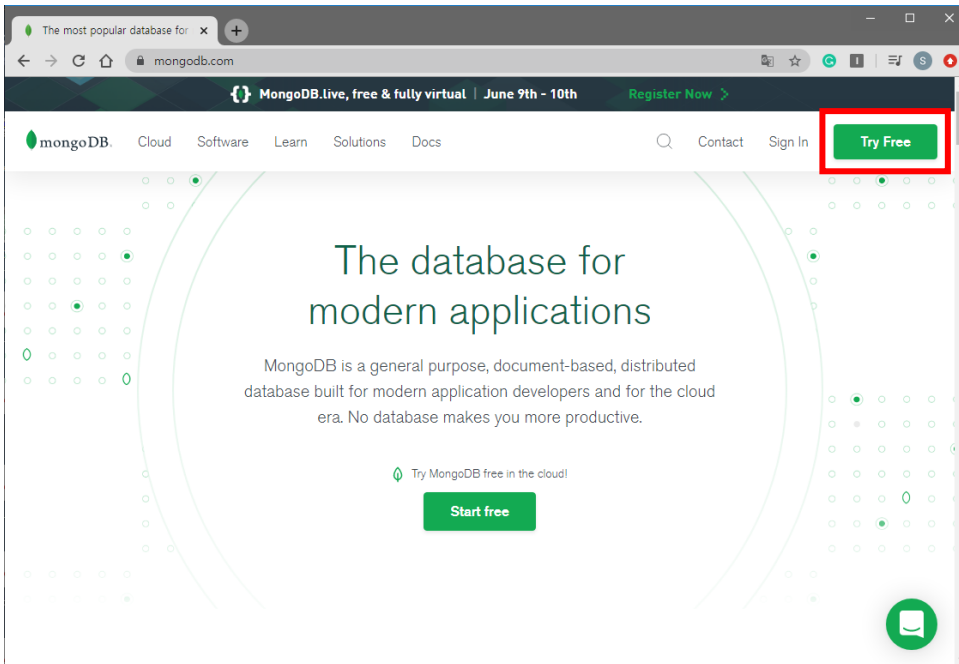
4. index.js가 index.jade 요청



따라서 위와 같은 화면이 보이게 됨

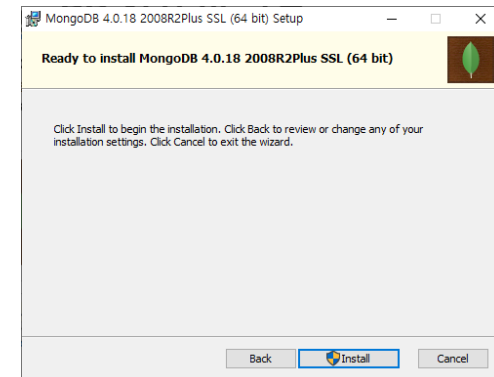
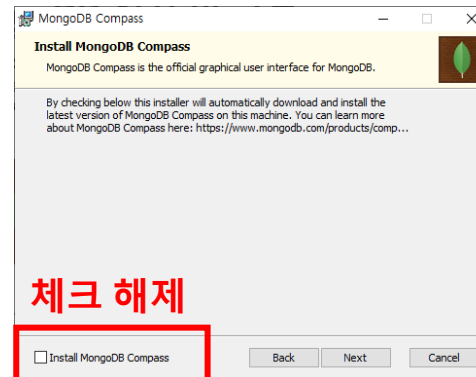
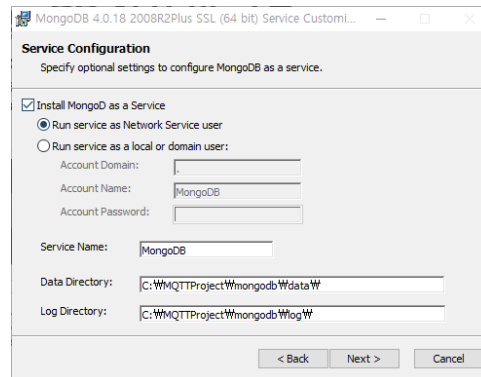
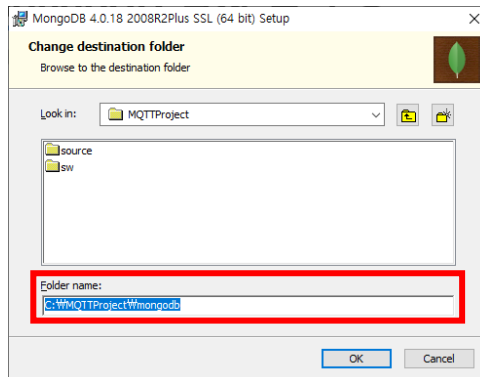
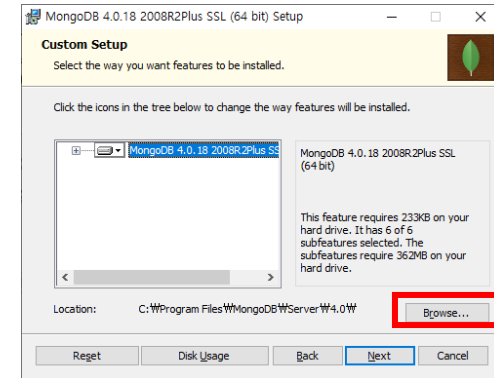
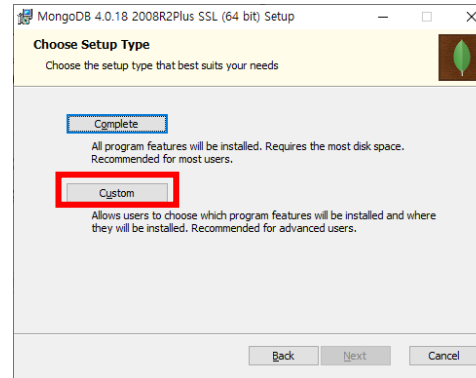
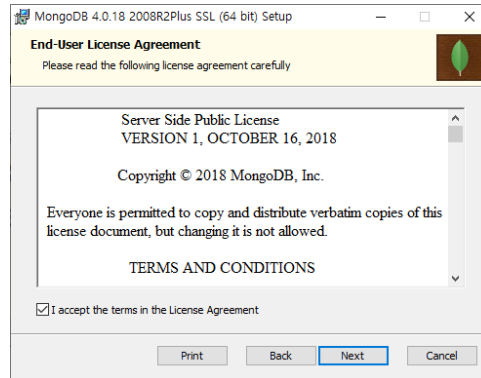
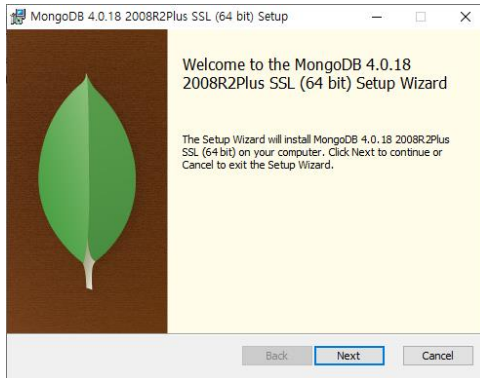
# MongoDB 설치 및 구동

- MongoDB 설치
  - <https://www.mongodb.com> 접속 → Try Free → Server
  - Version: 4.0.18 (previous release) → Download



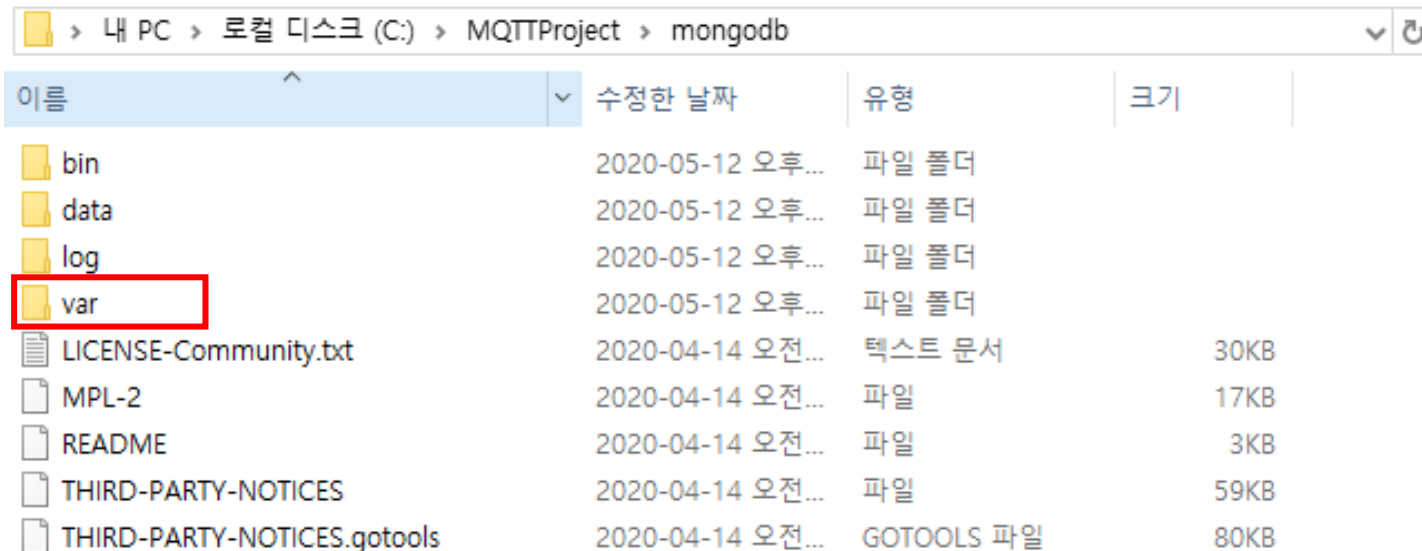
# MongoDB 설치 및 구동

- MongoDB 설치
  - 아래 절차를 따라 설치 진행



# MongoDB 설치 및 구동

- MongoDB 구동
  - MongoDB가 설치된 경로로 이동 후, var 폴더 생성



File Explorer path: > 내 PC > 로컬 디스크 (C:) > MQTTProject > mongodb

이름	수정된 날짜	유형	크기
bin	2020-05-12 오후...	파일 폴더	
data	2020-05-12 오후...	파일 폴더	
log	2020-05-12 오후...	파일 폴더	
var	2020-05-12 오후...	파일 폴더	
LICENSE-Community.txt	2020-04-14 오전...	텍스트 문서	30KB
MPL-2	2020-04-14 오전...	파일	17KB
README	2020-04-14 오전...	파일	3KB
THIRD-PARTY-NOTICES	2020-04-14 오전...	파일	59KB
THIRD-PARTY-NOTICES.gotools	2020-04-14 오전...	GOTOOLS 파일	80KB

# MongoDB 설치 및 구동

- MongoDB 구동

- CMD 실행 후, MongoDB가 설치된 경로의 bin 폴더로 경로 이동
- `mongod --dbpath C:\MQTTProject\mongodb\var` (자신의 MongoDB 설치 경로에 맞게 입력할 것)
- Waiting for connections on port 27017 이 CMD 하단에 나타나면 정상 구동된 것
- 포트번호는 27017임

CN 관리자: 명령 프롬프트

```
C:\MQTTProject\mongodb\bin>mongod --dbpath C:\MQTTProject\mongodb\var
```

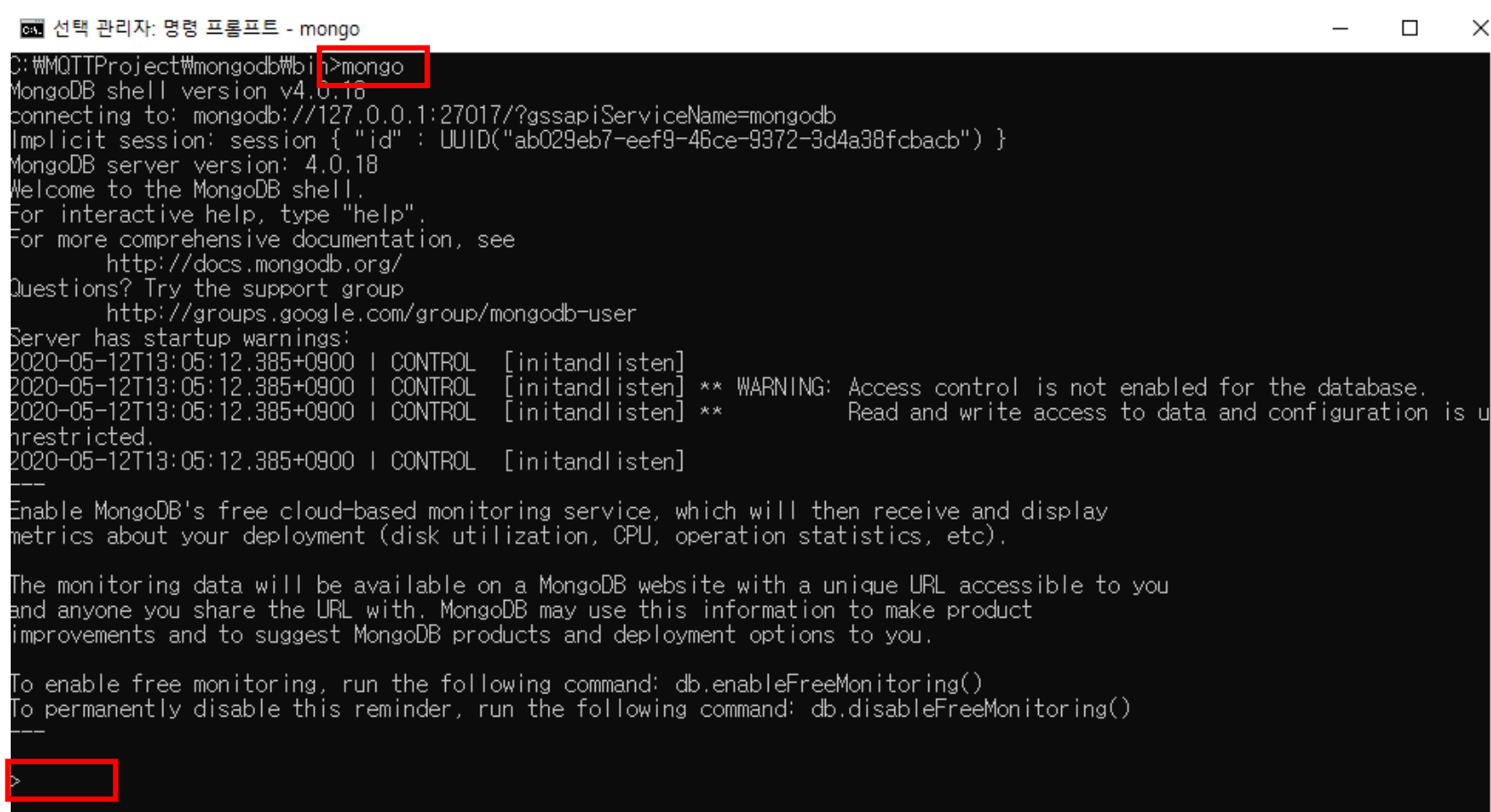
```
2020-05-12T13:11:47.065+0900 | SHARDING [LogicalSessionCacheReap] Marking collection config.transactions as collection version: <unsharded>
2020-05-12T13:11:47.065+0900 | NETWORK [initandlisten] waiting for connections on port 27017
2020-05-12T13:11:48.002+0900 | SHARDING [ftdc] Marking collection local.oplog.rs as collection version: <unsharded>
```

정상 구동 확인  
포트번호: 27017

# MongoDB 설치 및 구동

- MongoDB 구동

- CMD 실행 후, MongoDB가 설치된 경로의 bin 폴더로 경로 이동
- mongo (자신의 MongoDB 설치 경로에 맞게 입력할 것)
- Connection 완료 시, CMD 하단에 프롬프트가 뜸



```
C:\WMQTTProject\mongodb\bin>mongo
MongoDB shell version v4.0.18
connecting to: mongodb://127.0.0.1:27017/?gssapiServiceName=mongodb
Implicit session: session { "id" : UUID("ab029eb7-eef9-46ce-9372-3d4a38fcbacb") }
MongoDB server version: 4.0.18
Welcome to the MongoDB shell.
For interactive help, type "help".
For more comprehensive documentation, see
  http://docs.mongodb.org/
Questions? Try the support group
  http://groups.google.com/group/mongodb-user
Server has startup warnings:
2020-05-12T13:05:12.385+0900 | CONTROL  [initandlisten]
2020-05-12T13:05:12.385+0900 | CONTROL  [initandlisten] ** WARNING: Access control is not enabled for the database.
2020-05-12T13:05:12.385+0900 | CONTROL  [initandlisten] **           Read and write access to data and configuration is u
nrestricted.
2020-05-12T13:05:12.385+0900 | CONTROL  [initandlisten]
---
Enable MongoDB's free cloud-based monitoring service, which will then receive and display
metrics about your deployment (disk utilization, CPU, operation statistics, etc).

The monitoring data will be available on a MongoDB website with a unique URL accessible to you
and anyone you share the URL with. MongoDB may use this information to make product
improvements and to suggest MongoDB products and deployment options to you.

To enable free monitoring, run the following command: db.enableFreeMonitoring()
To permanently disable this reminder, run the following command: db.disableFreeMonitoring()
---
```



# MongoDB 설치 및 구동

- MongoDB 종료

- use admin 입력 → db.shutdownServer() 입력 → MongoDB 접속 종료

관리자: 명령 프롬프트 - mongo

```
> use admin
switched to db admin
> db.shutdownServer()
2020-05-12T13:26:12.190+0900 | NETWORK [js] DBClientConnection failed to receive message from 127.0.0.1:27017 - HostUnr
eachable: Connection reset by peer
server should be down...
2020-05-12T13:26:12.196+0900 | NETWORK [js] trying reconnect to 127.0.0.1:27017 failed
2020-05-12T13:26:12.199+0900 | NETWORK [js] reconnect 127.0.0.1:27017 ok
>
```

사용하지 않으면 항상 꺼주는 것이 안정적인

관리자: 명령 프롬프트

```
rosoft Windows 10", architecture: "x86_64", version: "10.0 (build 17763)" } }
2020-05-12T13:27:07.999+0900 | COMMAND [conn1] terminating, shutdown command received { shutdown: 1.0, lsid: { id: UUID
("ab029eb7-eef9-46ce-9372-3d4a38fcbac") }, $db: "admin" }
2020-05-12T13:27:07.999+0900 | NETWORK [conn1] shutdown: going to close listening sockets...
2020-05-12T13:27:07.999+0900 | CONTROL [conn1] Shutting down free monitoring
2020-05-12T13:27:08.000+0900 | FTDC [conn1] Shutting down full-time diagnostic data capture
2020-05-12T13:27:08.009+0900 | STORAGE [conn1] WiredTigerKVEngine shutting down
2020-05-12T13:27:08.009+0900 | STORAGE [conn1] Shutting down session sweeper thread
2020-05-12T13:27:08.009+0900 | STORAGE [conn1] Finished shutting down session sweeper thread
2020-05-12T13:27:08.102+0900 | STORAGE [conn1] shutdown: removing fs lock...
2020-05-12T13:27:08.103+0900 | CONTROL [conn1] now exiting
2020-05-12T13:27:08.103+0900 | CONTROL [conn1] shutting down with code:0
```

C:\MQTTProject\mongodb\bin>

C:\MQTTProject\mongodb\bin>

# 차주 수업 내용

- MQTT Programming #3



# Thank you

---

