

# Programmeren 6: Fullstack Webdevelopment (React & Node.js)

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*Knowledgebase: <https://luukftf.github.io/knowledgebase>*

*(code: <https://github.com/LuukFTF/knowledgebase>)*

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## Leerdoelen

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## A. backend - Nodejs & Express & MongoDB

<https://www.youtube.com/watch?v=ENrzd9HAZK4>

let vs var

let is in de scope, var doet onverwachte dingen

Functions

(function via parameter)

functie in een functie meegeven

```
function helle() {  
  console.log("Hello World")  
}  
  
function hello2(a) {  
  a()  
}  
  
hello2(hello)  
  
// Hello World
```

anonieme functie

```
let b = function() {  
  console.log("Anonieme Functie")  
}  
  
b()  
  
// Anonieme Functie
```

object functie

```
let j = {  
  "abc" : 1,  
  "xyx" : "asd",  
  "f1" : hello,  
  "f2" : b,  
  "f3" : function() {  
    console.log("Functie 3")  
  }  
}
```

```
j.f1()
j.f2()
j.f3()

// Hello World
// Anonieme Functie
// Functie 3
```

### callback function

```
if (true) {
  j.f1()
} else {

}
```

### nested functions

### Arrow Function

```
let f = () => {
  console.log("Random Arrow Function")
}
```

### IIFE old workaround for `var`

```
(function() {
:
:
})();
```

recursie regel 1. zorg dat het kan stoppen regel 2. zorg dat de recursie dichterbij de eindconditie kan komen

```
function recursion(n) {
  if (n == 1) {
    return 1
  }
  return n + recursion(n - 1)
}
```

### beter alternatief op recursion

```
function count(n) {  
  let total = 0;  
  for (let i = 1; i <= n; i++ ) {  
    total += 1  
  }  
  
  return total  
}
```

## NPM Packages

Express Mongoose Nodemon Dotenv

/node\_module gitignore

## Installing & Setup

installing software (windows)

```
winget install npm # install npm  
winget install nodejs # install nodejs  
winget install mongodb # install mongoddb  
  
npm -v # check if npm is correctly installed  
nodejs -v # check if nodejs is correctly installed  
mongodb -v # check if mongodb is correctly installed
```

setup new project

```
git clone # clone corresponding git repo  
  
npm install express mongoose dotenv # add express, mongoose & dotenv dependency to project  
npm install --save-dev nodemon # add nodemon dependency to project development  
  
npm i # install repo packages
```

.ENV

init

```
require('dotenv').config()
```

call

```
process.env.DATABASE_URL
```

**.env** file (.gitignore)

```
DATABASE_URL=mongodb://localhost/songs  
PORT=8000
```

**.env.example** file

```
DATABASE_URL=mongodb://host/dbname  
PORT=3000
```

Endpoint

**Resources**

Middleware

Models

Database

Mongoose Schema

Checker

<http://checker.basboot.nl/>

## B. HTTP, RESTfull API & OAuth

<https://www.youtube.com/watch?v=-MTSQjw5DrM>

**API** < an Application Programming Interface is an interface that defines interactions between multiple software applications or mixed hardware-software intermediaries. >

**idempotency** < Idempotence is the property of certain operations in mathematics and computer science whereby they can be applied multiple times without changing the result beyond the initial application. >

**Safe Method** < Deze method verandert niks op de server >

HTTP

Hypertext Transfer Protocol

Uniform Interface

stateless



Cacheable

## Software

Postman Insomnia

VScode extension: REST Client

## Methods

name	function	safe	idempotent	Status Code Response
POST	create		x	201
GET	read	x	x	200
PUT	create / update (geheel)		x	200
PATCH	update (deel)			200
DELETE	destroy		x	204
OPTIONS	get possible methods	x	x	200
HEAD	get without body	x	x	200
TRACE				200
CONNECT				200

**POST overloading** < sending HTTP requests that doesn't exist can be done with a POST request. You send a method with the header that specifies what custom request you are using (document this correctly) >

**Custom Methods** < another way to use create new request methods, is to use custom http methods, just exchange *post* for something else like *undelete* (document this correctly) >

## URIs

< Uniform Resource Identifier > <https://www.slideshare.net/landlessness/teach-a-dog-to-rest>

protocol://userinfo@subdomain.domain.tld:port/path?query#fragment

<https://api.com/v2/comet>

network\_location/resource

structuur / hierarchie (pad) nevenschikking ( 🤔 leesbaarheid (- \_) geen extensies (of extensies over de inhoud, liever application/json /xml (json .xml))

routing verbergt techniek

## Representatieformaten

Mensen: html

Mensen & Machines: html met microformats

Machines: json, xml, yaml, rss

## JSON

```
{
  "widget": {
    "debug": "on",
    "window": {
      "title": "Sample Konfabulator Widget",
      "name": "main_window",
      "width": 500,
      "height": 500
    },
    "image": {
      "src": "Images/Sun.png",
      "name": "sun1",
      "hOffset": 250,
      "vOffset": 250,
      "alignment": "center"
    },
    "text": {
      "data": "Click Here",
      "size": 36,
      "style": "bold",
      "name": "text1",
      "hOffset": 250,
      "vOffset": 100,
      "alignment": "center",
      "onMouseUp": "sun1.opacity = (sun1.opacity / 100) * 90;"
    }
  }
}
```

## XML

```
<widget>
  <debug>on</debug>
  <window title="Sample Konfabulator Widget">
```

```

        <name>main_window</name>
        <width>500</width>
        <height>500</height>
    </window>
    <image src="Images/Sun.png" name="sun1">
        <hOffset>250</hOffset>
        <vOffset>250</vOffset>
        <alignment>center</alignment>
    </image>
    <text data="Click Here" size="36" style="bold">
        <name>text1</name>
        <hOffset>250</hOffset>
        <vOffset>100</vOffset>
        <alignment>center</alignment>
        <onMouseUp>
            sun1.opacity = (sun1.opacity / 100) * 90;
        </onMouseUp>
    </text>
</widget>

```

## YAML

```

widget:
  debug: 'on'
  window:
    title: Sample Konfabulator Widget
    name: main_window
    width: 500
    height: 500
  image:
    src: Images/Sun.png
    name: sun1
    hOffset: 250
    vOffset: 250
    alignment: center
  text:
    data: Click Here
    size: 36
    style: bold
    name: text1
    hOffset: 250
    vOffset: 100
    alignment: center
    onMouseUp: sun1.opacity = (sun1.opacity / 100) * 90;

```

## Request

```
POST https://api.com/v2/comet HTTP/1.1
Accept: application/json
Authorization: <token>
Connection: keep-alive

{
  "body": "body"
}
```

VERB / resource uri / protocol

## Response

```
HTTP/1.1 200 OK
Age: 2323
Connection: keep-alive

{
  "id": "2"
  "status": "3"
}
```

protocol / statuscode

## Basic Networking

### IP/TCP & OSI model

Packets (information)

7 layers

L7 - Application {L6 - Presentation} {L5 - Session}

L4 - Transport - protocol / ports (TCP & UDP + https:443, http:80, ssh:22, ftp) L3 - Network - ip adressen L2 - Data Link - mac adressen L1 - Physical - ethernet ports

### Statuscodes

Uniform Interface kan errors afhandelen HTTP Errors

#### 2XX good

200 - OK 201 - Created 204 - No Content

#### 3XX recoverable error

300 - Multiple Choices 302 - Found (redirect) 304 - Not Modified

#### **4XX client error**

400 - Bad Request 401 - Unauthorized 403 - Forbidden 404 - Not found

#### **5XX server error**

500 - Internal Server Error 501 - Not Implemented 503 - Service Unavailable

### **CORS headers**

#### **General**

```
vb. res.header("Acces-Control-Allow-Origin", "*"); res.header("Acces-Control-Allow-Headers", "Origin, X-  
Requested-With, Content-Type, Accept")
```

#### **Options**

### RESTfull API

**RESTful** < *Representational State Transfer, invented by Roy Fielding in 2000* >

JSON

### API Documentation

OpenAPI Specification <https://swagger.io/specification/>

Postman

### HATEOAS (Linking)

< *Hypermedia as the Engine of Application State* > <https://en.wikipedia.org/wiki/HATEOAS>

### **HAL**

[https://en.wikipedia.org/wiki/Hypertext\\_Application\\_Language](https://en.wikipedia.org/wiki/Hypertext_Application_Language)

```
{  
  "_links": {  
    "self": { "href" : "http://api....." },  
    "collection": { "href" : "http://api....." }  
  }  
}
```

#### **link relation types**

self collection alternate edit related previous & next first & last

## Pagination

start (begin bij 1) limit (aantal)

```
GET /items?start=6&limit=5
Accept: application/json
```

pagina 6 tot en met 10

```
{
  "pagination": {
    "currentPage": 2,
    "currentItems": 5,
    "totalPages": 2,
    "totalItems": 10,
    "links": {
      "first": {
        "page": 1,
        "href": "/items?start=1&limit=5"
      },
      "last": {
        "page": 2,
        "href": "/items?start=6&limit=5"
      },
      "previous": {
        "page": 1,
        "href": "/items?start=1&limit=5"
      },
      "next": {
        "page": 2,
        "href": "/items?start=6&limit=5"
      },
    },
  },
}
```

## Response Categories

items links pagination

```
GET /items/
Accept: application/json
```

```
HTTP/1.1 200 OK
Content-Type: application/json
```

```
{
  "items": [
    {
      "id": "200",
      "title": "test",
      "links": {
        "self": "/items/200"
      }
    },
    {
      "id": "201",
      "title": "test",
      "links": {
        "self": "/items/201"
      }
    },
  ],
  "links": {
    "self": "/items/"
  },
  "pagination": {
    "currentPage": 1,
    "currentItems": 4,
    "totalPages": 1,
    "totalItems": 4,
    "links": {
      "first": {
        "page": 1,
        "href": "/items/"
      },
      "last": {
        "page": 1,
        "href": "/items/"
      },
      "previous": {
        "page": 1,
        "href": "/items/"
      },
      "next": {
        "page": 1,
        "href": "/items/"
      }
    }
  }
}
```

## Type RESTFULL Resources

**REST Resource** < *Het type resource wat in de body teruggestuurd word* >

Detail < *all data of specific item* >

```
GET https://pokeapi.co/api/v2/pokemon/4
Accept: application/json
```

```
HTTP/1.1 200 OK
Content-Type: application/json

{
  "id": 4,
  "name": "charmander",
  "base_experience": 62,
  "height": 6,
  "weight": 85,
  "location_area_encounters": "https://pokeapi.co/api/v2/pokemon/4/encounters",
  "stats": [
    {
      "base_stat": 39,
      "stat": {
        "name": "hp",
        "url": "https://pokeapi.co/api/v2/stat/1/"
      }
    },
    {
      "base_stat": 52,
      "stat": {
        "name": "attack",
        "url": "https://pokeapi.co/api/v2/stat/2/"
      }
    }
  ],
}
```

GET, PUT/PATCH, DELETE, OPTIONS

Collection < *list of items with indexable information* >

```
GET https://pokeapi.co/api/v2/pokemon
Accept: application/json
```

```
HTTP/1.1 200 OK
Content-Type: application/json

{
  "results": [
    {
      "name": "bulbasaur",
```



```
    "url": "https://pokeapi.co/api/v2/pokemon/1/"
  },
  {
    "name": "ivysaur",
    "url": "https://pokeapi.co/api/v2/pokemon/2/"
  },
  {
    "name": "venusaur",
    "url": "https://pokeapi.co/api/v2/pokemon/3/"
  },
  {
    "name": "charmander",
    "url": "https://pokeapi.co/api/v2/pokemon/4/"
  },
  {
    "name": "charmeleon",
    "url": "https://pokeapi.co/api/v2/pokemon/5/"
  },
  {
    "name": "charizard",
    "url": "https://pokeapi.co/api/v2/pokemon/6/"
  },
  {
    "name": "squirtle",
    "url": "https://pokeapi.co/api/v2/pokemon/7/"
  }
]
"pagination": {
  "currentPage": 1,
  "currentItems": 7,
  "totalPages": 160,
  "count": 1118,
}
}
```

GET, POST, OPTIONS

Composition < a combination of different types of resources >

```
GET https://pokeapi.co/api/v2/location/2/
Accept: application/json
```

```
HTTP/1.1 200 OK
Content-Type: application/json
```

```
{
  "id": 2,
  "name": "eterna-city",
  "region": {
```

```

    "name": "sinnoh",
    "url": "https://pokeapi.co/api/v2/region/4/"
  }
  "areas": [
    {
      "name": "eterna-city-area",
      "url": "https://pokeapi.co/api/v2/location-area/2/"
    },
    {
      "name": "eterna-city-west-gate",
      "url": "https://pokeapi.co/api/v2/location-area/788/"
    }
  ],
  "game_indices": [
    {
      "game_index": 9,
      "generation": {
        "name": "generation-iv",
        "url": "https://pokeapi.co/api/v2/generation/4/"
      }
    }
  ],
}

```

GET, OPTIONS, (PUT/PATCH)

Function < *functional resource, custom input generates custom output* */distance/rdam;adam* >

```

GET https://pokeapi.co/api/v2/battle/4;6
Accept: application/json

```

```
// calculation who wins the battle with stats and winner
```

GET, OPTIONS

Controller < *special function* >

```

GET https://pokeapi.co/api/v2/hit
Accept: application/json

```

```
// calculation if a pokemon is still alive after a hit, amount left & stats
```

POST, OPTIONS

OPTIONS < see what html methods are possible on this link >

```
OPTIONS https://pokeapi.co/api/v2/pokemon/4/  
Accept: application/json
```

```
// insert options response  
GET, PUT/PATCH, DELETE, OPTIONS
```

## Queries

Filter

/pokemon?type=fire

OAuth

## C. operations - VPS & Linux

Virtual Private Server (VPS)

Basic Networking / VPS commands

```
ssh username@ip
```

## Linux

<https://cheatography.com/davechild/cheat-sheets/linux-command-line/>

### Basic BASH commands

```
pwd # Show current directory  
mkdir [dir] # Make directory  
cd [dir] # Change directory to dir  
cd .. # Go up a directory  
ls # List files  
-a # Show all (including hidden)  
-t # Sort by last modified  
-S # Sort by file size  
cp [dir/name] [newdir/name] # copy  
mv [dir/name] [newdir/name] # move  
rm [dir/name] # remove  
touch [name] # new file  
  
ps # process snapshot  
kill [pid] # kill process
```

```
uptime # Show uptime
uname -a # Show system and kernel
whoami # Show your username
help / man # manuals and information
clear # clear screen

CTRL-C # Stop dcurent running command
```

## Installing Backend MERN

### installing software (linux)

```
sudo apt update # update apt packages
sudo apt install npm # install npm
sudo apt install nodejs # install nodejs
sudo apt install mongodb # install mongoddb

npm -v # check if npm is correctly installed
nodejs -v # check if nodojs is correctly installed
mongodb -v # check if mongodb is correctly installed
```

### installing project on server / locally

```
git clone / pull [repo] # clone or pull repository

cd [dir] # change directory to repo dir

npm i # install repo packages
node . # start node index.js

sudo systemctl start mongodb # start mongodb server

sudo systemctl status mongodb # check status of mongodb server
```

### configuration

```
mongo --eval 'db.runCommand({ connectionStatus: 1 })' # diagnostic mongo command

sudo systemctl stop mongodb # stop mongodb server
sudo systemctl restart mongodb # restand mongodb server

sudo ufw status # check firewall status

sudo nano /etc/mongodb.conf # edit mongodb config
```

## Installing Frontend MERN

### File Rights

<https://www.linux.com/training-tutorials/understanding-linux-file-permissions/>

Read Write eXecute RWX

list with rights `ls -l`

```
drwxrwxr-x 3 ubuntu-user ubuntu-group 4096 Nov 23 10:59 helloworld
drwx----- 2 root          dialout    4096 Dec 3  13:54 test
```

Rights Owner Group Other

Right codes Owner, Group, Other

--==-----==

d: directory r: read w: write x: execute

change right modus `chmod` change owner `chown`

## D. frontend - React

## E. frontend - Sass

styleguides <http://styleguides.io/>

<https://web.archive.org/web/20170523012226/http://codepen.io/guide/#one>

## Links

<https://www.youtube.com/watch?v=fgTGADljAeg>

end of file

publish date: 0000-00-00

modified date: 0000-00-00