

# Node Tech Plus 2019

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NODE.JS

# WHAT IS NODE?

- ▶ v8 javascript engine
- ▶ Event driven
- ▶ Non-blocking standart libraries
- ▶ C C++ addons
- ▶ NPM

# nodejs system

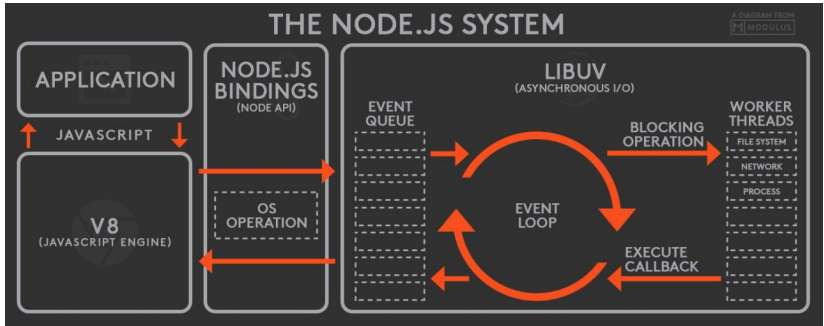


Figure 1: nodejs system

# Modules

- ▶ Prevents pollution of the global scope
- ▶ Module structure
- ▶ `module.exports`
- ▶ Caching

# Modules: types

- ▶ js
- ▶ node
- ▶ json

## Modules: require

```
var module1 = require('module1');  
var module1 = require('./node_modules/module1/index.js');  
var module2 = require('./module2');  
var module3 = require('../module3');
```

## Modules: exports

```
exports.log = function(msg) {  
    console.log(msg);  
}
```

```
module.exports = function Logger() {  
    this.log = function(msg) {  
        console.log(msg);  
    }  
};
```



## structure of “module” object

```
{  
  "id": "The identifier for the module. Typically this is",  
  "exports": "Public interface of the module",  
  "parent": "The module that first required this one.",  
  "filename": "The fully resolved filename to the module.",  
  "loaded": "Whether or not the module is done loading, c",  
  "children": "The module objects required by this one."  
}
```

NPM / YARN

# NPM

- ▶ package.json
- ▶ npm init
- ▶ npm install
  - ▶ `-save`
  - ▶ `-save-dev`
  - ▶ `-global`
- ▶ npm publish
- ▶ npm view (info)
- ▶ npm version
  - list of global modules **`npm ls -g -depth=0`***

## package.json structure

```
{  
  "name": "name of package",  
  "version": "version of package (major.minor.patch)",  
  "description": "package description",  
  "main": "entry point (index.js as default)",  
  "bin": "object with global registration names (PATH) and",  
  "scripts": "dictionary containing script commands that",  
  "files": "array of files to include in your project",  
  "keywords": "array of strings, using for search",  
  "author": "package author",  
  "license": "package license",  
  "repository": "specify the place where your code lives",  
  "bugs": "the url to your project's issue tracker.",  
  "homepage": "the url to the project homepage.",  
}
```

## lifecycle events

<code>publish:</code>	<code>prepublish, publish, postpublish</code>
<code>install:</code>	<code>preinstall, install, postinstall</code>
<code>uninstall:</code>	<code>preuninstall, uninstall, postuninstall</code>
<code>version:</code>	<code>preversion, version, postversion</code>
<code>test:</code>	<code>pretest, test, posttest</code>
<code>stop:</code>	<code>prestop, stop, poststop</code>
<code>start:</code>	<code>prestart, start, poststart</code>
<code>restart:</code>	<code>prerestart, restart, postrestart</code>

Figure 2: lifecycle events

# EventEmitter/streams/pipe

- ▶ EventEmitter
- ▶ fs
- ▶ http
- ▶ stream-adventure

# EventEmitter

```
var EventEmitter = require('events');  
var emitter = new EventEmitter();  
var listener = (arg) => {console.log(arg);};  
emitter.on('test', listener);  
setTimeout(function() {  
    emitter.emit('test', 'Hello world');  
    emitter.removeListener('test', listener);  
    emitter.emit('test', 'Hello world');  
}, 1000);
```

## Readable Stream

```
var fs = require('fs');
var readableStream = fs.createReadStream('file.txt');
var data = '';
readableStream.on('data', function(chunk) {
    data+=chunk;
});
readableStream.on('end', function() {
    console.log(data);
});
```



## Writable Streams

```
var fs = require('fs');  
var readableStream = fs.createReadStream('file1.txt');  
var writableStream = fs.createWriteStream('file2.txt');  
readableStream.on('data', function(chunk) {  
    writableStream.write(chunk);  
});
```

duplex, transform streams

```
a.pipe(b).pipe(a)
```

```
a.pipe(b).pipe(c)
```

# Pipe

```
var writableModuleStream = fs.createWriteStream('module.txt');
var stream = fs.createReadStream('data.csv');
stream.on('readable', onFileRead);
stream.on('end', function() {
    writableModuleStream.end();
});
```

```
function onFileRead() {
    var data = stream.read();
    if (data && !writableModuleStream.write(data)) {
        stream.removeListener('readable', onFileRead);
        writableModuleStream.once('drain', function() {
            stream.on('readable', onFileRead);
        });
    }
}
```

fs + http

```
var http = require('http'),
    fs = require('fs');
http.createServer(function(request, response) {
  if (req.method === 'POST') {
    fs.readFile('./data.csv', 'utf-8', function(err, data) {
      response.end(data);
    });
  } else res.end('send me a POST\n');
}).listen(3000);
```

ASYNCHRONOUS CODE

- ▶ Node-style
- ▶ Promises (Q)
- ▶ Async
- ▶ Generators(ES6)

## Node-style

```
var someModule = require('./some_module');
someModule.sum({ x: 1, y: 2 }, function(err, result) {
  if (err) {
    console.log(err);
    return;
  }
  console.log(result);
});
```

## Promises (Q)

```
var someModule = require('./some_module');
var qSum = Q.denodeify(someModule.sum);
Q({ x: 1, y: 2 })
  .then(qSum)
  .then(function(result) {
    console.log(result);
  })
  .catch(function(error) {
    console.log(error);
  });
```



# Async

```
var async = require('async');
var someModule = require('./some_module');
async.waterfall([
  function(callback) {
    callback(null, { x: 1, y: 2 });
  },
  someModule.sum,
  function(result, callback) {
    console.log(result);
  },
], function (err, result) {
  console.log(err);
});
```

# Generators

```
var Q = require('Q');
var co = require('co');
var someModule = require('./some_module');
var qSum = Q.denodeify(someModule.sum);
function* test() {
  try {
    var result = yield qSum({x: 1, y: 2});
    console.log(result);
  } catch(err) {
    console.log(err);
  }
};
co(test);
```

## async/await

```
function caserUpper(val) {  
  return new Promise((resolve, reject) => {  
    resolve(val.toUpperCase());  
  });  
}
```

```
async function msg(x) {  
  try {  
    const msg = await caserUpper(x);  
    console.log(msg);  
  } catch(err) {  
    console.log('Ohh no:', err.message);  
  }  
}
```

## SETUP APPLICATION

- ▶ npm init
- ▶ lock files
- ▶ eslint
- ▶ prettier
- ▶ babel
- ▶ pre-commit
- ▶ lint-staged
- ▶ typescript
- ▶ dependency injection (Inversify)
- ▶ config (dotenv)

REST (Representational State Transfer)

# METHODS

Safety / Idempotency

HTTP Method	Safe	Idempotent
<b>GET</b>	+	+
<b>PUT</b>	-	+
<b>DELETE</b>	-	+
<b>POST</b>	-	-
<b>PATCH</b>	-	-

# RESPONSE STATUS CODES

- ▶ 1xx informational
- ▶ 2xx success
- ▶ 3xx redirect
- ▶ 4xx client error
- ▶ 5xx server error



# REST API IS COMPOSED OF

- ▶ docroot
- ▶ resource
- ▶ collection
- ▶ controller

# RESOURCES

GET        /pet/{petId} (find pet by Id)  
PUT        /pet/{petId} (update an existing pet)  
DELETE    /pet/{petId} (delete a pet)  
POST       /pet/{petId}/uploadImage (upload an image)

# Examples

## FILTERING

GET /comments?filter[post]=1,2&filter[author]=12 HTTP/1.1

## PAGINATION

GET /articles?page[number]=3&page[size]=1 HTTP/1.1

# Values

- ▶ Uniform Interface
- ▶ Stateless Interactions
- ▶ Cacheable
- ▶ Client-Server
- ▶ Layered System
- ▶ Code on Demand

# GOLDEN RULES

- ▶ Flat is better than nested
- ▶ Simple is better than complex
- ▶ Strings are better than numbers
- ▶ Consistency is better than customization

GraphQL

EXPRESS

# BASICS

- ▶ Middleware concept
- ▶ Configuration of express
- ▶ Request
- ▶ Response



## Middleware concept

```
var express = require('express');
var app = express();
app.use(bodyParser.json());
app.use(function (req, res, next) {
  console.log('Time:', Date.now());
  next();
});
app.get('/user', function(req, res) {
  res.send('hello user');
});
app.listen(3000, function () {
  console.log('Example app listening on port 3000!');
});
```

# ROUTING

- ▶ Respond to HTTP requests with a callback
- ▶ Supports variable placement in routes
- ▶ Easy to serve JSON
- ▶ Routing filter types

```
app.get('/', function (req, res) {});  
app.post('/:id', function (req, res) {});  
  
var express = require('express');  
var router = express.Router();  
router.put(/\/abc\/xyz/, function (req, res) {});  
router.delete(['/', '\/:id'], function (req, res) {});
```

# Templating

```
app.set('view engine', 'ejs');  
app.locals.title = 'My App';  
app.get('/', function (req, res) {  
  res.locals.someText = 'test';  
  res.render('test', { message: 'Hello there!' });  
});
```

DEVELOPMENT

- ▶ postman
- ▶ winston
- ▶ nodemon
- ▶ inspect
- ▶ Debugging (`-inspect -inspect-brk`)
- ▶ Cluster
- ▶ *UV\_THREADPOOL\_SIZE*
- ▶ pm2
  - ▶ `pm2 start * --watch`
  - ▶ `pm2 list`
  - ▶ `pm2 monit`
  - ▶ `pm2 stop all`

## Error Handling

- ▶ Exceptions
- ▶ Async/await node express

```
const express = require('express');
require('express-async-errors');
const User = require('./models/user');
const app = express();

app.get('/users', async (req, res) => {
  const users = await User.findAll();
  res.send(users);
});
```

SECURITY



- ▶ root
- ▶ eval is EVIL
- ▶ HTTPS
- ▶ CORS
- ▶ CSP
- ▶ Do not trust anyone
- ▶ HTTP Headers (helmetjs)

# SECURITY TOOLS

- ▶ Node.js Security Checklist
- ▶ nodesecurity
- ▶ snyk
- ▶ retire.js

## DB Overview

Questions?

# Links

- ▶ BE with NestJs
- ▶ The Twelve Factors

# Notes

*ab -c 50 -n 500 localhost:3000/fast*