Multimedia im Netz

Online Multimedia

Winter semester 2015/16

Tutorial 07 – Major Subject

Today's Agenda

- Showcase: Spotify Search
- NodeJS:
  - Setup
  - Express Generator
  - Middleware
- Break Out
- Quiz

Evaluation & Feedback

Please help us improve the tutorials and assignments by filling out this survey:

http://goo.gl/forms/DTdGh4TYaC

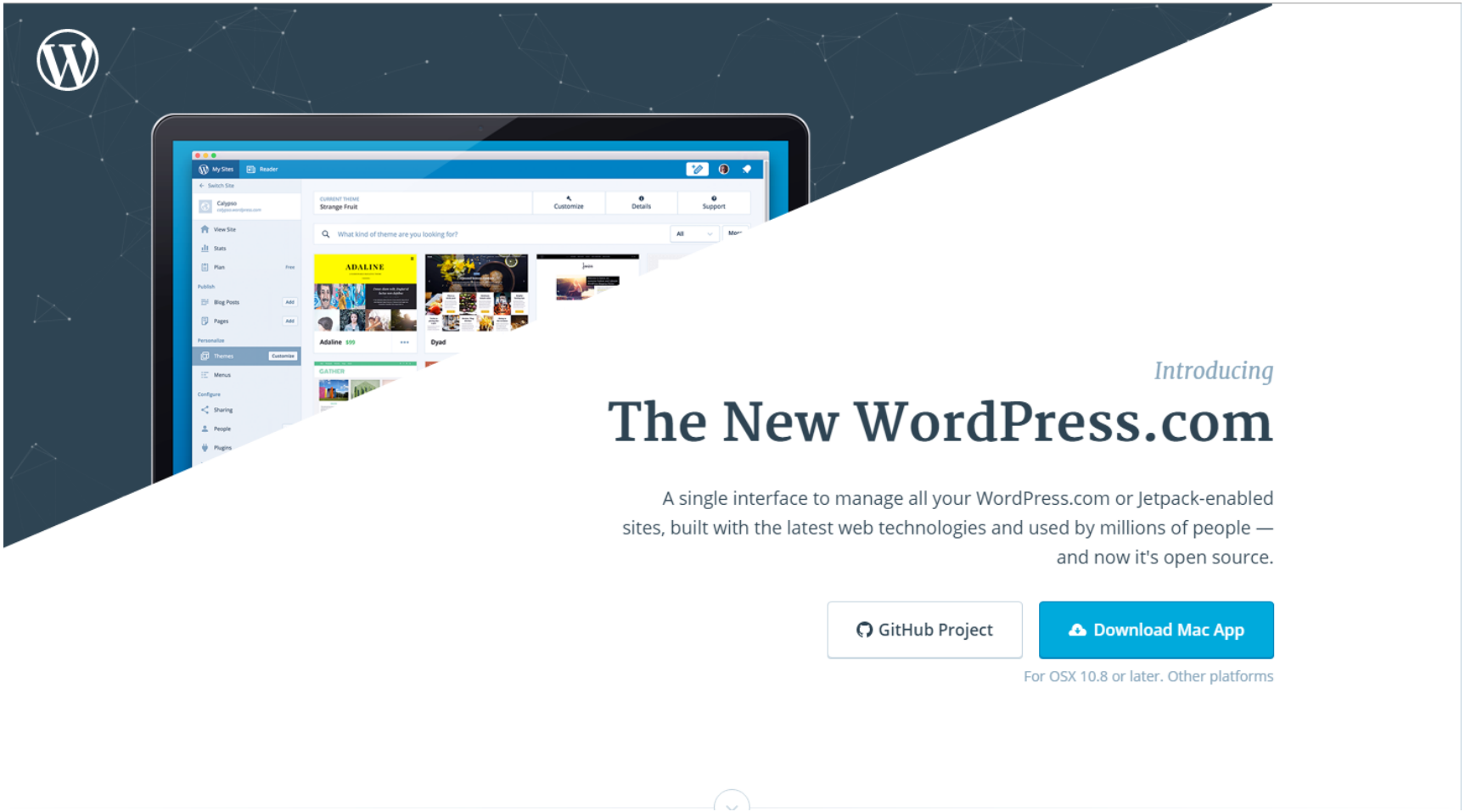
NodeJS - About

- What is it?
  "Node.js® is a platform built on **Chrome's JavaScript runtime** for easily building fast, scalable network applications" (official website, nodejs.org)
- Node apps are JavaScript files!
- Why do we want it?
  - non-blocking I/O
  - highly scalable
  - web-apps can act as standalone web-server
  - largest ecosystem open source libraries

NodeJS – Who is using it?

https://github.com/nodejs/node-v0.x-archive/wiki/Projects,-Applications,-and-Companies-Using-Node

WordPress.com: Making the Switch



https://developer.wordpress.com/2015/11/23/the-story-behind-the-new-wordpress-com/

Installing NodeJS

- Windows:
  - Download installer and run it
    https://nodejs.org/en/download/
  - make sure to install npm during the installation (default)
- OS X
  - Option 1: download and install package from nodejs.org
    https://nodejs.org/en/download/
  - Option 2: Homebrew
    brew install node
    http://shapeshed.com/setting-up-nodejs-and-npm-on-mac-osx/
- Linux:
  - please follow the instructions provided here:
    https://github.com/nodejs/node-v0.x-archive/wiki/Installing-Node.js-via-package-manager
- Find out if the installation was successful. Type in a terminal:
  - `node –v`
  - `npm –v`

Starting a node app from the Command Line

- On your own machine:
  ```
  $ node <path_to_file>
  ```

- On a CIP pool computer:
  ```
  $ nodejs <path_to_file>
  ```

Hello World!

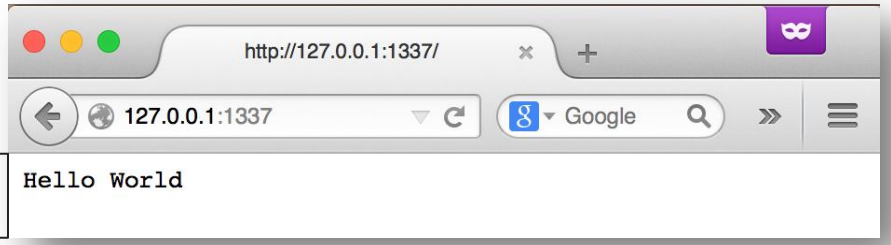
```
var http = require('http');
var port = 8976;
var host = '127.0.0.1';

var server = http.createServer(function (request, response) {
    response.writeHead(200, {'Content-Type': 'text/plain'});
    response.end('Hello World\n');
});

server.listen(port, host);
console.log('Server running at http://'+host+':'+port+'/');
```

Then in a the terminal type:

```
$ node helloworld.js
```



examples/helloworld.js

Node Package Manager

- Node is highly modular and extensible with “packages”
- npm allows you to easily handle packages from the command line and declare them as dependencies
- Most important operations:
  - Global package installation
    ```
    npm install –g PACKAGE [PACKAGE2 PACKAGE3 ...]
    ```
  - Local package installation (only for the app)
    ```
    npm install PACKAGE [PACKAGE2 PACKAGE3 ...]
    ```
  - Local package installation & saving to dependencies list:
    ```
    npm install ––save PACKAGE [PACKAGE2 ...]
    ```

Package script – package.json

```
{
  "name": "examples",
  "version": "1.0.0",
  "description": "",
  "main": "app.js",
  "scripts": {
    "start" : "nodejs app.js"
  },
  "author": "",
  "license": "MIT",
  "dependencies": {
    "body-parser": "^1.14.1"
  }
}
```

```
$ npm install
```
installs all dependencies that are listed in the package script into the node_modules directory

Require

- To import a module, you can use require():
```
var http = require('http');
```

- Mind the difference:
```
require('module');
require('./module');
```
  - Without path specification, node tries to import from the `node_modules` directory (dependencies managed by npm)
  - With path specification:
    * Your own modules
    * Need to call this: `module.exports = something;`

Hands On: Create your first node app

- Open a bash and type

```
mkdir tutorial07 && cd tutorial07
npm init
```

  follow the wizard (always hitting the return key is okay).

- Now you'll have your own package script package.json to which you can add your dependencies

Express – a web application framework

- One of the most popular NodeJS frameworks.
- Characteristics:
  - minimalistic
  - easy to use API
  - many utility methods and middleware functionalities
  - thin layer on top of NodeJS
- Side notes:
  - responsible for the letter **E** in the MEAN stack

- Find the documentation here: http://expressjs.com/

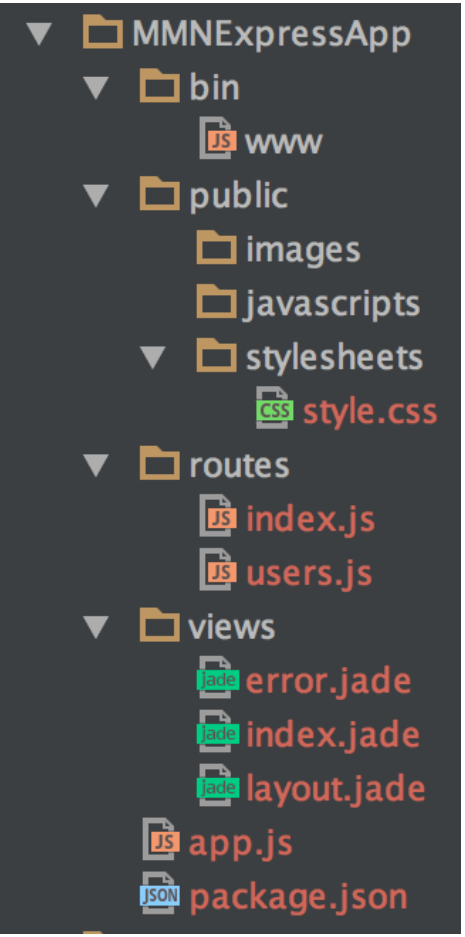
Basic Express App

```
var express = require('express');
var app = express();

app.get('/', function (req, res) {
    res.send('Hello World!');
});

var server = app.listen(3000, function () {
    var host = server.address().address;
    var port = server.address().port;
    console.log('app listening at http://%s:%s',
        host, port)
});
```

Express generator



- Goal: automatically generate the basic structure of an express app that includes **views, routes, common dependencies**
- Requirements: Install the generator globally:

```
$ npm install –g express–generator
$ express MMNExpressApp
```

- Documentation: http://expressjs.com/starter/generator.html
- You still have to install the dependencies manually:

```
$ cd MMNExpressApp && npm install
```

Express Generator: bin/www

- The server process is started here (executable file)
  ```
  $ node bin/www
  ```

- Port:
  ```
  var port = normalizePort(process.env.PORT || '3000');
  ```
  - normalizePort is also defined in this file. It simply tries to parse the port to an integer.
  - process.env.PORT: accesses the environment variable “PORT”
  - If there is no such environment variable, the default ‘3000’ is used.

- Common error handlers for EACCES and EADDRINUSE

Express Generator: app.js

- All non-core modules for express are imported here, e.g.
  - `var bodyParser = require('body-parser');`
    Middleware that parses HTTP message bodies and stores the result in req.body (POST) or req.query (GET)
  - `var logger = require('morgan');`
    HTTP Request logger (generates console output)

- Middleware and basic routing setup

```
var routes = require('./routes/index');
app.use('/', routes);
```

Express Generator: routes/*.js (1)

- Routing is the definition of end points (URIs)
- With a node app, routing is a little more elaborate than with PHP scripts.
  - With PHP/Apache: scripts in different folders, accessible immediately https://localhost/folder/subfolder/subsubfolder/script.php
  - Express: more details how to handle paths and routing
- Route ≈ Path ≈ Mountpoint ≈ Endpoint
- Example:

```
app.get('/a-route/sub-route', function(req,res){
  res.send('You are on a sub-route.')
});
```

http://expressjs.com/starter/basic-routing.html

Express Generator: routes/*.js (2)

- Express includes a lightweight router module
```
var router = express.Router();
```
- Defining a route that handles GET requests:
```
router.get('/getRoute', function(req, res) {
  res.send('hello world');
});
```
- Defining a route to handle POST requests:
```
router.post('/postRoute', function(req, res){
  res.send('hello world, from post!');
});
```
- To use the route in the app, the router object needs to be exported:
```
module.exports = router;
```

http://expressjs.com/guide/routing.html

Express Generator: views/*.jade

- Views are templates that are compiled by the webapp
- The default rendering engine is Jade
- routes/index.js shows how a template is rendered:

```
router.get('/', function(req, res, next) {
  res.render('index', { title: 'Express' });
});
```

- The rendering parameters are passed as JavaScript object

Middleware

- A middleware is a function that sits between the request and the response (“in the middle”)
- Does something with the request. Typical tasks:
  - parse the HTTP message body to a JSON object (**`body-parser`**)
  - parse cookies (**`cookie-parser`**)
  - authenticate the user and (dis)allow a request
- Usually more than one middleware per route (middleware chain)

```
app.use('/',function(req,res,next){
  // do something with req.object
  // then either send the response or call:
  next();
});
```

- Express router = middleware!

Serving static files and directories

- Express has a built-in middleware to serve directories, e.g. for HTML, CSS, JavaScript, or image files: `express.static`
- Example usage in app.js to serve a directory named “public”:
```
app.use(express.static('public'));
```
- Content of the directory is accessible from the server root:
  http://localhost:3000/images/kitten.jpg
  http://localhost:3000/hello.html
- You can also specify a mount-path:
```
app.use('/kittens',express.static('images/kittens'));
```
- The path is relative to the node process, so do this:
```
app.use(express.static(__dirname + '/public'));
```

http://expressjs.com/starter/static-files.html

Break Out: Your First Node App

- Use the express generator to initialize a node app
- Play around with it and try the following:
  - add a new route /mmn
    - define it first in routes/index.js
    - then try to re-wire the route as new file /routes/mmn.js
  - respond with a dynamically generated JSON object that contains the current date-time and UNIX timestamp:

```
{
    date: "2015-11-28T17:23:22.557Z",
    millis: 1448731402557
}
```

- Timeframe: 40 Minutes

Good to know…

- Never add the “node_modules” directory to version control (Git). It is enough to declare the dependencies in package.json
- The EADRRINUSE error:
  - The port is already used by another application
  - Try a different port (high number) or
  - Quit the application that’s using the port, e.g.
    $ killall node

Some more links

- http://nodeschool.io/
- http://nodeguide.com/beginner.html
- http://blog.mixu.net/2011/02/01/understanding-the-node-js-event-loop/
- http://docs.nodejitsu.com/articles/getting-started/what-is-require
- http://docs.nodejitsu.com/articles/getting-started/npm/what-is-npm
- http://stackoverflow.com/questions/2353818/how-do-i-get-started-with-node-js

Round-up Quiz

1. Name one difference between the NodeJS and Apache
2. What does require(...) do?
3. How do you generate a package script?
4. How do you conveniently save a dependency on a module into the package script?
5. What does the body-parser middleware do?
6. What is a middleware?

Thanks!

What are your questions?

Sources

- http://www.talentbuddy.co/blog/building-with-node-js-at-ebay/
- http://www.talentbuddy.co/blog/building-with-node-js-at-netflix/
- http://venturebeat.com/2011/08/16/linkedin-node/