Multimedia im Netz

Online Multimedia

Winter semester 2015/16

Tutorial 14 – Major Subject

Today's Agenda: Exam Preparation

- Announcement
- AJAX
  - Vanilla
  - jQuery
  - Polymer
- NodeJS
  - npm
  - Middleware
- PHP + MySQL
- HTML 5 Canvas
- Theory

Announcements

- Repetition Sheet (assignment 14)
  - for your individual preparation
  - cannot be submitted to UniWorX
  - Try to complete the tasks on paper
  - Do not look up things on the Internet, while you do the tasks. Use your lecture/tutorial material and notes

Exam (1)

- The exam is open book
- Bring:
  - handwritten notes, printed slides, code, books (if necessary)
  - valid student card
  - valid personal ID card
- Leave at home:
  - any electronic device. That includes calculators of any kind, phones, computers, smart watches, etc.

Exam (2)

- You need to register on UniWorX to participate:
  - choose “Major Subject (Hauptfach)”
  - Registration hard deadline: 08.02.2016 10:00
  - De-registration hard deadline: 09.02.2016 10:00
- If you do not de-register and not show up, the attempt will be counted as “failed”.

- Date: **11.02.2016 10:00 – 12:00** (90 minutes writing time)
- Location: M118 & A240Hauptgebäude, Geschwister-Scholl-Platz 1

- Retry exam probably early April, but we’d prefer if you passed the first exam ☺
- Grades will take a while. Don’t write hasty emails.

Breakout: Questions!

- Take 5 minutes time to write down questions
- Topics:
  - anything from the tutorial
  - anything from the assignments
- We are going to collect your questions and answer as many as possible during this tutorial.

AJAX

AJAX Basics

- Acronym: **A**synchronous **J**avaScript **A**nd **X**ML
- Allows passing around data between client- and server-side applications back and forth – **without refreshing the page**
- AJAX requests (also: XHR = XMLHttpRequest):
  - GET: retrieve data – no manipulation on the server
  - POST: modify data (and/or retrieve data)
- Nowadays XML mostly replaced by JSON (in JavaScript environments)

Example Data: artists.json

- Let's fetch this asynchronously

```
[
  {
    "name": "Arcade Fire",
    "members": [
      "Win Butler",
      "Régine Chassagne",
      "William Butler",
      "Richard Reed Parry",
      "Tim Kingsbury",
      "Jeremy Gara"
    ]
  },...
]
```

- The data should then be displayed as heading (band name) and unordered list (members)

AJAX with Vanilla JavaScript

```
var req = new XMLHttpRequest();
req.onreadystatechange = function(){
    var artists;
    var vanillaOutput = document.querySelector('#vanilla-output');

    if(req.readyState == 4 && req.status == 200){
        artists = JSON.parse(req.responseText);
        artists.forEach(function(artist){
            var heading = document.createElement('h3');
            var list = document.createElement('ul');
            heading.innerHTML = artist.name;
            artist.members.forEach(function(member){
                var item = document.createElement('li');
                item.innerHTML = member;
                list.appendChild(item);
            });
            vanillaOutput.appendChild(heading);
            vanillaOutput.appendChild(list);
        });
    }
};
req.open('GET','artists.json',true);
req.send();
```

AJAX with jQuery

```
$.get('artists.json',function(artists){
    var jqueryOutput = $('#jquery-output');
    $(artists).each(function(){
        var heading = $('<h3>');
        var list = $('<ul>');
        heading.html(this.name);
        $(this.members).each(function(){
            var item = $('<li>');
            item.html(this);
            list.append(item);
        });
        jqueryOutput.append(heading);
        jqueryOutput.append(list);
    });
});
```

AJAX with Polymer

```
<template is="dom-bind">
    <iron-ajax url="artists.json"
               auto
               last-response="{{artists}}">
    </iron-ajax>
    <template is="dom-repeat"
              items="[[artists]]">
        <h3>[[item.name]]</h3>
        <template is="dom-repeat"
                  items="[[item.members]]">
            <li>[[item]]</li>
        </template>
    </template>
</template>
```

NodeJS + Express

NodeJS Basics

- What is it?
  "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."
  (official website, nodejs.org)
- Node apps are JavaScript files! → Server-side JavaScript
- Why do we want it?
  - non-blocking I/O
  - scalable
  - web-apps act as standalone web-server
  - largest ecosystem of open source libraries

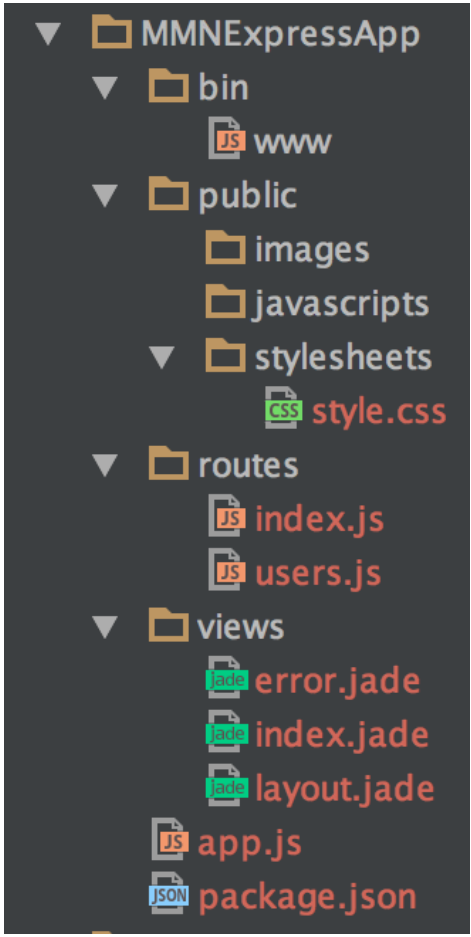
npm

- Node package manager.
- package.json:
  - Package-information
  - dependencies
- Common usage:
  `npm install --save body-parser`
- Install packages globally:
  `npm install -g bower`
- Run a script:
  `npm run start`

```
{
  "name": "mmn-examples",
  "version": "0.0.0",
  "description": "examples",
  "scripts": {
    "start": "node bin/www"
  },
  "author": "Tobias Seitz",
  "license": "MIT",
  "dependencies": {
    "body-parser": "^1.14.2"
  }
}
```

Express

- Web app framework for NodeJS
- Can be set up with the express-generator package
- Features:
  - Middleware
  - Routing
  - Templates
- Currently the most popular framework for NodeJS



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();
});
```

Middleware Example

```
app.use(function(req,res,next){
  if( req.query.secret == 'mmn' ||
      req.body.secret == 'mmn'){
    req.isAuthenticated = true;
  }
  next();
});
app.use('/myartists',function(req,res){
  if(req.isAuthenticated){
    res.sendFile(path.join(__dirname,'../artists.json'));
  }
  else{
    res.json({
      message : 'sorry, you are not allowed to go here.'
    })
  }
});
```

NodeJS: Your Questions (Assignment 07)

- What functionality goes into our custom module spotify.js, what goes into index.js?
  - The idea is that index.js serves as a routing module. Its “concerns” are therefore: include other modules, register routes for them
- Which of these contain the middleware?
  - both, because the router object is middleware
  - index.js : `router.use('/spotify',spotify);`
  - spotify.js:
    ```
    router.use('/',express.static(path.join(__dirname,
    '../spotifysearch')));
    ```
- Middleware function: `function (req, res[, next]) {...}`
  - You see middleware functions in:
    - app.use(…), app.get(…), app.post(…), …
    - router.use(…), router.get(…), router.post(…)

PHP & MySQL

PHP Example: “Add my number” What’s the problem?

```
<!DOCTYPE html>
<html><head lang="en"><meta charset="UTF-8">
    <title></title></head><body>
<?php
if(isset($_POST['add'])) {
    $currentCounter = 0;
    echo "$currentCounter + " . $_POST['add']
         . " = " . ($currentCounter + $_POST['add']);

    $currentCounter += $_POST['add'];
}
?>
<form method="POST" action="add-my-number.php">
    <input type="number" placeholder=""
           name="add">
    <input type="submit" name="submit" value="Add">
</form>
</body></html>
```

Breakout: Code-Along PHP

- Fix the code from the previous slide.
- When the form is submitted, the number from the input field should be added to the previous result.
- Timeframe: 10 minutes

PHP + MySQL

- Multiple functions and APIs available for PHP to work with databases:
  - mysql („Deprecated“ since PHP 5.5.0)
  - **mysqli** (i is for „improved“)
  - PDO (PHP Data Objects)
- „mysql“ is still supported for older PHP versions
- It is highly recommendable to use mysqli or PDO

mysqli (object oriented)

- Establish connection
```php
$c = new mysqli("host","user","password","db");
```

- PHP statement for MySQL query
```php
$results = $c->query($query);
```

- Process the results
```php
$results->fetch_assoc();
$results->fetch_row();

$results->fetch_all(MYSQLI_BOTH);
$results->fetch_all(MYSQLI_ASSOC);
$results->fetch_all(MYSQLI_NUM);
```

- Close the connection
```php
$c->close();
```

mysqli Example

id	amount	reason	person	spending_date
(INT PRIMARY KEY AUTO_INCREMENT)	(FLOAT NOT NULL)	(VARCHAR NOT NULL)	(VARCHAR NOT NULL)	(DATE NOT NULL)

```php
<?php
$host = 'localhost'; $user = 'mmn1516';
$password = 'mmnpassword'; $database = 'mmn1516';

$c = new mysqli($host,$user,$password,$database);

$now = date('Y-m-d H:i:s');
$queryString = "INSERT INTO expenses
            (amount,reason,person,spending_date)
            VALUES (25,'coffee beans','Max','$now')";

$c->query($queryString);

$queryString = "SELECT * FROM expenses";
$results = $c->query($queryString);

while($row = $results->fetch_assoc()){
    echo
        $row['id'].' '.$row['amount'].' '.
        $row['reason'].' '.$row['person'].' '.
        $row['spending_date'].'<br />';
} ?>
```

PHP+MySQL: Your Questions

- When do we use “regular” mysqli queries, when do we need prepared statements?
  - Both are fine in pretty much all situations.
  - Differences:
    - Prepared statements require a litte more effort
    - Regular mysqli queries tend to be less secure (SQL injections)

HTML5

Quiz: HTML5

- Name 3 elements that are ‘new’ in HTML5!
- Which document type is correct for HTML5:
  a) <!DOCTYPE html>
  b) <!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 5.0//EN" "http://www.w3.org/TR/html5/strict.dtd">
  c) <!DOCTYPE HTML5>
- onblur and onfocus are…
  a) elements
  b) event attributes
  c) style attributes
- Which attribute of <script> is no longer required?
  rel | href | src | type

http://www.w3schools.com/quiztest/quiztest.asp

Breakout: Draw the output!

```
var x,y;
var canvas = document.getElementById('canv');
var context = canvas.getContext('2d');
var columns = 3, rows = 4, size = 20, offset = 5;

for(var i = 0; i < columns; i++){
    for(var j = 0; j < rows; j++){
        x = i * (size + offset), y = j * (size + offset);

        context.beginPath();
        context.fillStyle = i % 2 == 0 ? '#0000ff' : '#ff0000';

        context.strokeStyle = '#000000';
        context.lineWidth = "2";

        context.rect(x,y,size,size);
        context.stroke();
        context.fill();
    }
}
```

Assignment 13 - HbbTV 2.0

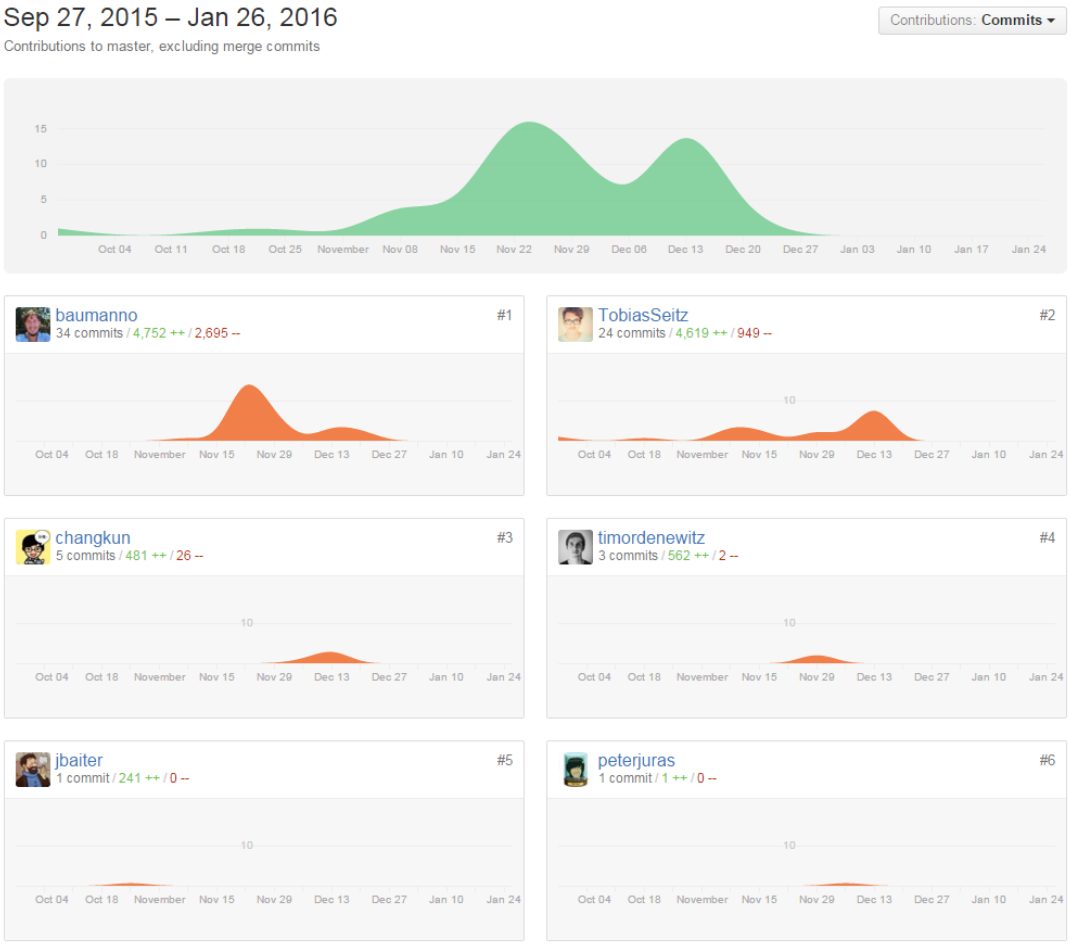
- Most anticipated features:
  - HTML5 user experiences
  - UltraHD
  - Seamless viewing across TV, tablet, smartphone
  - Second screens (interactivity, backchannels)
- HEVC = High efficiency video coding
  - Known as H.265 / MPEG-H 2
  - Successor to H.264 / MPEG-4-AVC
  - Competitor to VP9 (respectively VP10)

https://en.wikipedia.org/wiki/High_Efficiency_Video_Coding

MPEG-DASH

- DASH: Dynamic Adaptive Streaming over HTTP
- Video files are available as fragments in different resolutions.
- 1st step: Client requests manifest file with available options
- Key feature: Adaptive Bitrate (ABR)
  - reduces buffering by requesting fragment with the best quality that can be transferred without video-stalling (freeze)
  - reduces traffic because lower quality is requested automatically
- Article:
  - Heavily congested networks: many clients on the same network
  - YouTube's HTML5 player is DASH compatible → automatic selection of best possible quality

The GitHub Contributors - Thanks!!



Tutors wanted!

- If you enjoyed this course and are excited about the topic, become a tutor in the next winter semester!

- Responsibilities:
  - run tutorials (at least one)
  - help with corrections
  - help students with programming

- Feel free to contact us for further details ☺
  tobias.seitz@ifi.lmu.de

Thanks for joining!

Good luck for the exam!