Middleware Architectures 2

Motivation and Course Overview

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Humla v1.0

Overview

- Motivation
- Scope, Requirements, Learnings
- Assessment, Resources, Communication

Web 2.0

- A new version of the Web?
- Principles
  - *Read-Write Web*
  - ***Programmable Web***
  - ***Realtime Web***
  - *Social Web*

Motivation in Brief

- Need for highly performant and scalable apps
  - *Sudden increase in traffic*
  - *Slashdot effect*
- The Web is programmable
  - *Applications provide **data** and **functionality***
  - *Users – end-users (GUI) and programmers (API)*
  - *Any company with a Web presence has an API*
    → *Google, Amazon, LinkedIn, Facebook, ...*

AM2 and AM1 Courses

- **AM2 builds on AM1**
- Application Architecture
  - *Multi-tier client-server architecture*
  - *Cloud native and microservices*
  - *Interface of the app, REST*
  - *Client side of the architecture, JavaScript, AJAX*
  - *Infrastructure empowered by cloud technologies*
- Technology, Platform
  - *JavaScript*
    - → *client-side + related technologies*
    - → *server-side – asynchronous I/O, node.js*
  - *It does not mean you cannot combine technologies*
    - → *Node.js as a Web server, ESB for proxy services with back-end systems, all running in a cloud environment (auto scaling, load balancers, message queues, etc.)*

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Scope

- Advanced HTTP
  - *Same origin policy, cross-origin*
  - *OAuth, Open ID, JWT*
  - *Realtime Web protocols*
- Cloud Architectures
  - *Details of some IaaS and PaaS services*
  - *Cloud Native, Microservice Architecture*
  - *Containers*
  - *Docker, Kubernetes*

Organization of Lectures

- 12 Lectures
  - *Czech: Mon 11:00-12:30, TH:A-s134*
- Plan
  - *17.02.2025 – Motivation and Course Overview*
  - *24.02.2025 – Asynchronous I/O*
  - *03.03.2025 – Browser Networking (SOP, CORS)*
  - *10.03.2025 – Security (concepts, TLS, JWT)*
  - *17.03.2025 – Security (OAuth, OpenID)*
  - *24.03.2025 – Protocols for the Realtime Web (streaming, SSE)*
  - *31.03.2025 – Protocols for the Realtime Web (WebSocket)*
  - *07.04.2025 – Cloud Architectures (introduction, IaaS)*
  - *14.04.2025 – Container Architecture (container runtime, Docker)*
  - *21.04.2025 – Easters*
  - *28.04.2025 – Kubernetes Architecture (workloads, storage, security)*
  - *05.05.2025 – Kubernetes Networking (overlay network, services, load balancers)*
  - *12.05.2025 – Kubernetes Performance (self-healing, scalability)*

Organization of Practicals

- Work alone, you can collaborate
- Practicals every second week
- Number of sessions: 6-7, 5 major tasks
  1. *Introduction, JavaScript*
  2. *CORS/JSONP*
  3. *OAuth (JWT)*
  4. *Realtime Web*
  5. *TBD*
- Plus a number of tasks to complete at home

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Assessment

- Labs
  - *Presence is mandatory*
    - → *You can miss up to 1 lab without sending regrets*
  - *Total maximum points: P=40*
    - → *exercises for labs + your activity + your homeworks*
  - ***to pass**: P >= 20*
- Final exam
  - *Mandatory written test: 3 parts, ~1 hour*
    - → *each gives you a max. of 20 points, the total E = 60 points*
    - → *you must have at least 50% of points from each theme covered by a test part and 50% of points in total*
  - *Final score:*
    - → *P + E = 100 maximum points*
    - → *The more points you have from labs, the better for the exam!*

Assessment – Final Marks

Mark	Points	In words
A	100–90	výborně
B	89–80	velmi dobře
C	79–70	dobře
D	69–60	uspokojivě
E	59–50	dostatečně
F	49–0	nedostatečně

Source: http://www.cvut.cz/pracoviste/pravni-odbor/dokumenty/studijni-predpisy/studijnirad.pdf

- Everything good and bad will count
  - *practicals, coding, (pro-)activity, passiveness, hacking, lectures, exam, cheating, ...*

Resources

- Online sources
  - *https://courses.fit.cvut.cz/NI-AM2/ – lectures and labs information*
  - *http://w20.vitvar.com – both html and pdf (1 and 2 slides per page)*
- Books
  - *I. Grikorik: High Performance Browser Networking, O'Reily 2013*
  - *B. Burns: Designing Distributed Systems, O'Reily 2018*
  - *L. Richardson, M. Amundsen: RESTful Web APIs, O'Reilly Media, May 2015, ISBN 978-1-449-35806-8.*
- Other
  - *Many sources on the Web, to be listed throughout the course*
  - *A lot of W3C sources, Web architecture, HTTP*

About Slides

- Humla – Open Source HTML5 Presentation Environment
  - *every slide has a unique URL*
  - *all figures linked with Google drawings*
  - *possible to format and print in PDF*
  - *running local, with back-end NodeJS support, and offline*
  - *Fork it at Humla github repo*
- Keys

1	*default browsing mode*
2	*slideshow mode (automatically scales to full screen)*
3	*grid (overview) mode*
4	*print mode, 2 slides per page*
←	*slide left*
→	*slide right*
d	*debug mode*
e	*toggle last error messages on/off*