

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: $P \geq 20$
- 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