

Middleware Architectures 1

Motivation and Course Overview

doc. Ing. Tomáš Vitvar, Ph.D.

tomas@vitvar.com • @TomasVitvar • <https://vitvar.com>



Czech Technical University in Prague

Faculty of Information Technologies • Software and Web Engineering • <https://vitvar.com/lectures>



Modified: Sun Nov 19 2023, 19:53:57
Humla v1.0

Hellos

- Tomáš Vitvar – lectures (Czech)
 - *Web engineering program chair at CTU FIT*
 - *Technology Architect Director at Oracle*
 - *Research*
 - *Web Services, Web Intelligence, Semantic Web*
 - *Industry*
 - *Large scale integration architecture projects (Vodafone UK, IKEA IT Sweden, Turkish Telecom)*
 - *Design, governance, troubleshooting, performance tuning*
- Jaroslav Kuchař – labs (Czech)
 - *Research assistant at CTU FIT, Seznam.cz*
 - *Web usage mining, big data analytics, Web services*
- Milan Dojčinovski – lectures and labs (English)
 - *research assistant at CTU FIT, Ph.D. candidate*
 - *Semantic Web, Linked Data, NLP, Web services*

- Web engineering is...
 - *far beyond PHP and HTML!*



Overview

- Course at a Glance
 - *Motivation and Scope*
 - *Requirements and Organization*
- Assessment
- Communication and Resources

What is Middleware?

- Say anything you think has something to do with middleware
 - *Architecture*
 - *Tehnology*
 - *Tools*
 - *Concept or style*
 - *Methodology*
 - ...
 - *No worries, there is no bad answer!*

Motivation in Brief

- Systems rely on complex infrastructures
 - *A lot of data and many processes, internal and external*
 - *As people communicate, underlying systems must too*
 - *But:*
 - *variety of data formants, technologies, protocols*
 - *variety of architectures, client-server, peer-to-peer, ...*
- Rapid changes in applications' functionalities
 - *modular development*
 - *reuse of application logic*
 - *low costs – do it now and quickly!*
 - *Good performance*
 - *frequent changes in applications' loads, peak hours*
 - *scalability – effective load balancing*
 - *low costs – cheaper to outsource?*

Scope

- Architectural and conceptual basis
 - *What is architecture – enterprise, processes, data, software*
 - *Service concepts, integration patterns, middleware*
- Backend technologies
 - *Communication protocols – HTTP, TLS, HTTP/2*
 - *Application backend and requests handling*
 - *Advances of REST, gRPC*
- Performance and Scalability
 - *Performance tuning*
 - *Load balancers*

Overview

- Course at a Glance
 - *Motivation and Scope*
 - *Requirements and Organization*
- Assessment
- Communication and Resources

Prerequisites

- Object-oriented programming
 - *Principles*
 - *class, object, inheritance, encapsulation, ...*
 - *basis for service concepts*
- Java
 - *All code examples will be in Java*
 - *All lab work will be in Java*
- Web Architecture
 - *Basics of REST, HTTP, URI/URL*
- Other
 - *Networking*
 - *Basics of OS*

Organization of Lectures

- 12 Lectures
 - *Czech: Mon 9:15-10:45, T9:107*
 - *English: TBA*
- Plan
 1. 25.09.2023 – *Motivation and Course Overview*
 2. 02.10.2023 – *Information System Architectures*
 3. 09.10.2023 – *Service Architecture 1*
 4. 16.10.2023 – *Service Architecture 2*
 5. 23.10.2023 – *Communication protocols, HTTP, TLS*
 6. 30.10.2023 – *HTTP/2 and HTTP/3*
 7. 06.11.2023 – *Application Server Architecture*
 8. 13.11.2023 – *REST*
 9. 20.11.2023 – *HATEOAS, Caching, Concurrency Control*
 10. 27.11.2023 – *Other service technologies*
 11. 04.12.2023 – *High Availability and Performance 1*
 12. 11.12.2023 – *High Availability and Performance 2*
 13. 18.12.2023 – *Rserve*

Organization of Labs

- Individual work (no teams!)
- Labs every second week
- Number of labs: 6
 1. *Introduction - Setup, Simple Web Application*
 2. *REST – Basics, development of a REST service*
 3. *REST advanced*
 4. *TBA*
 5. *Messaging systems*
 6. *Monitoring and analysis*

Methodology for Lab Work

- No app development, not directly related assignments
 - *assignment every second week*
 - *be prepared for the lab!*
 - *work alone, ask others for advices*
 - **Results:**
 - *5 completed tasks*
 - *you will submit results to gitlbab@FIT*

Overview

- Course at a Glance
- **Assessment**
- Communication and Resources

Assessment

- Labs
 - *Every task gives you the maximum of 6 points = 30 points in total*
 - *Activity in labs gives you the maximum of 10 points*
 - *Total maximum points = 40, **to pass**: 20 points minimum*
- Final exam
 - *Written exam: 3 exercises, 1 hour*
 - *each gives you a max. of 20 points, the total is 60 points*
 - *To pass, you need to have at least 50% from each exercise!*
 - *Final score:*
 - *100 points maximum*

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>

Overview

- Course at a Glance
- Assessment
- Communication and Resources

Communication

- Language
 - *Text: English (slides, tweets, posts, instructions, etc.)*
 - *Voice: Czech and English (English version of the course)*
- Direct
 - *you can always contact me directly at tomas@vitvar.com or [@TomasVitvar](https://twitter.com/TomasVitvar)*

Overview of Resources

- Overview of resources

Item	URL
Course slides	http://mdw.vitvar.com
Courses@FIT	https://courses.fit.cvut.cz/NI-AM1/
Lab projects	https://gitlab.fit.cvut.cz/
Assessment	https://grades.fit.cvut.cz/courses/NI-AM1/

- Books

- *L. Richardson, S. Ruby: RESTful Web Services: Web services for the real world, O'Reilly Media, May 2007, ISBN 9780596529260.*
- *I. Grigorik: High Performance Browser Networking, O'Reilly Media, May 2013, ISBN 978-1-449-34476-4.*
- *Thomas Erl: Service-Oriented Architecture: Concepts, Technology, and Design. Prentice Hall, Aug 2, 2005.*

About Slides

- Humla – Open Source HTML5 Presentation System
 - *every slide has a unique URL*
 - *all figures linked with Google drawings*
 - *auto-generated PDFs (1 and 2 slides per page) using travis-ci*
 - *running local (with local nodejs-based http server), and in github pages*
 - *Suggest edits or correct errors by pull requests at [mdw github repo](#)*
- Keys
 - 1 *default browsing mode*
 - 2 *slideshow mode (automatically scales to fullscreen)*
 - 3 *grid (overview) mode*
 - 4 *print mode, 2 slides per page*
 - ← *slide left*
 - *slide right*