

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 Sep 19 2021, 20:29:19
Humla v0.3

Hellos

- Tomáš Vitvar – lectures (Czech)
 - *Web engineering program chair at CTU FIT*
 - *Technology Architect Director at Oracle*
 - *Research*
 - *Web Intelligence, Semantic Web, Linked Data, Web Services*
 - *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 Curricula – bird's view

- Web 2.0 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 Oriented Architecture, Service Concepts, Middleware*
- Backend technologies
 - *Communication protocols – HTTP*
 - *Application backend and requests handling*
 - *Details of REST and relation to SOAP*
- Performance and Scalability
 - *Performance metrics*
 - *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 XML, XPath, HTTP, URI*
- Other
 - *Networking*
 - *Regular expressions, basics of Linux*

Organization of Lectures

- 12 Lectures
 - *Czech: Mon 9:15-10:45, T9:107*
 - *English: TBA*
- Plan
 1. 19.09.2022 – Motivation and Course Overview ([html](#))
 2. 26.09.2021 – Information System Architectures ([html](#))
 3. 03.10.2021 – Service Architectures and Integration Patterns 1 ([html](#))
 4. 10.10.2021 – Service Architectures and Integration Patterns 2 ([html](#))
 5. 17.10.2021 – Communication Protocols 1 ([html](#))
 6. 24.10.2021 – Communication Protocols 2 ([html](#))
 7. 31.10.2021 – Application Server Architecture 1 ([html](#))
 8. 07.11.2021 – Application Server Architecture 2 ([html](#))
 9. 14.11.2021 – Representational State Transfer 1 ([html](#))
 10. 21.11.2021 – Representational State Transfer 2 ([html](#))
 11. 28.11.2021 – HATEOAS, Caching, Concurrency Control 1([html](#))
 12. 05.12.2021 – HATEOAS, Caching, Concurrency Control 2 ([html](#))
 13. 12.12.2021 – High Availability and Performance ([html](#))

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. *SOAP Web services*
 5. *Messaging Services - JMS*
 6. *Web Logic Metrics and Load Balancing*

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
 - *Presence is mandatory*
 - *You can miss up to 1 lab without sending regrets*
 - *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

- Jiří Voříšek: *Strategické řízení informačního systému a systémová integrace*. Management Press, 1997.
- 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*