Middleware and Web Services

Motivation and Course Overview

doc. Ing. Tomáš Vitvar, Ph.D.
tomas@vitvar.com • @TomasVitvar • http://vitvar.com

Czech Technical University in Prague
Faculty of Information Technologies • Software and Web Engineering • http://vitvar.com/courses/mdw

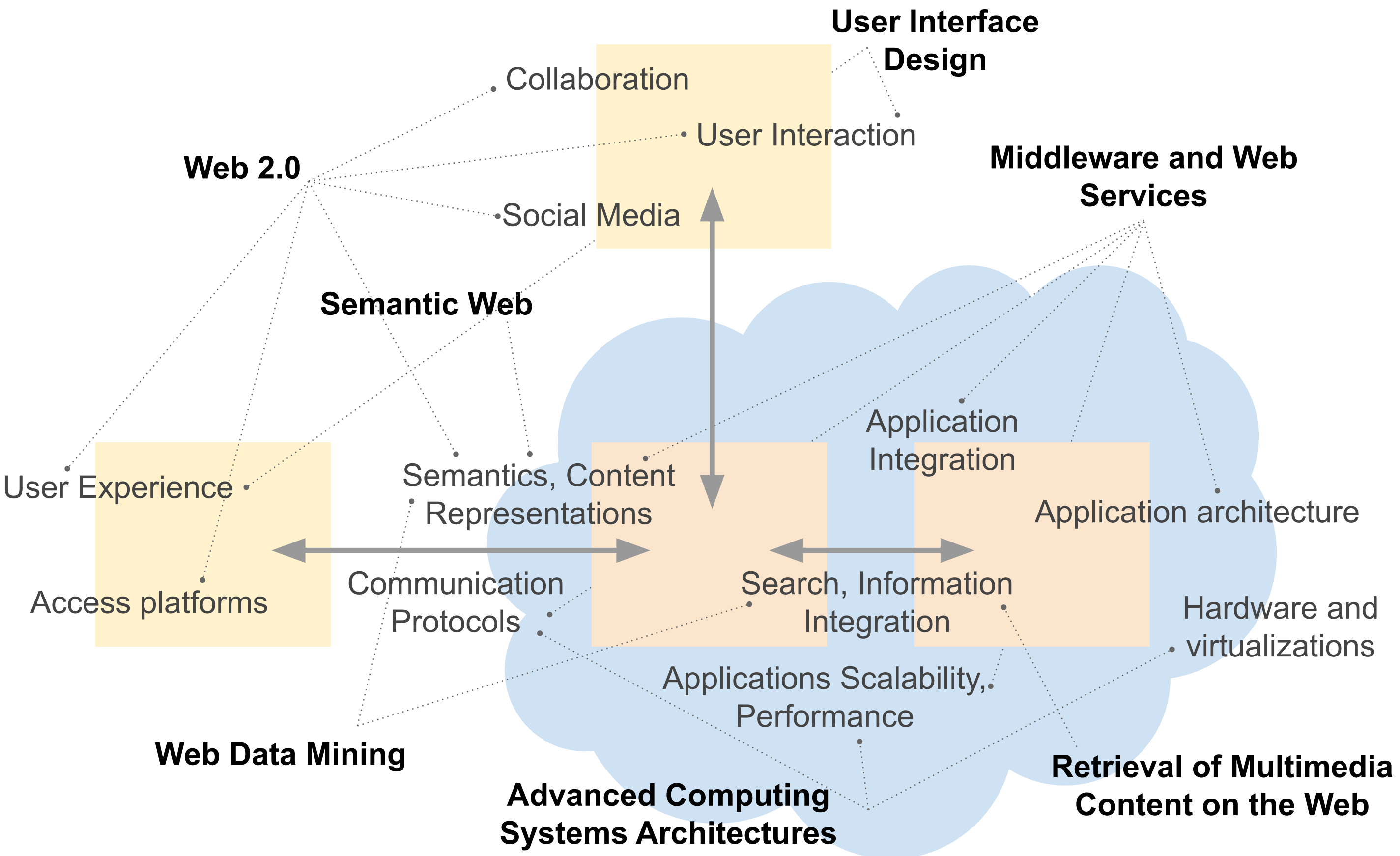
Modified: Sun Oct 06 2019, 21:20:20
Humla v0.3

Hellos

- Tomáš Vitvar – lectures (Czech)
  - *Web engineering study programme 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!*


User Interface Design
Collaboration
User Interaction
Web 2.0
Middleware and Web Services
Social Media
Semantic Web
Application Integration
User Experience
Semantics, Content Representations
Application architecture
Access platforms
Communication Protocols
Search, Information Integration
Hardware and virtualizations
Applications Scalability, Performance
Web Data Mining
Retrieval of Multimedia Content on the Web
Advanced Computing Systems Architectures

Overview

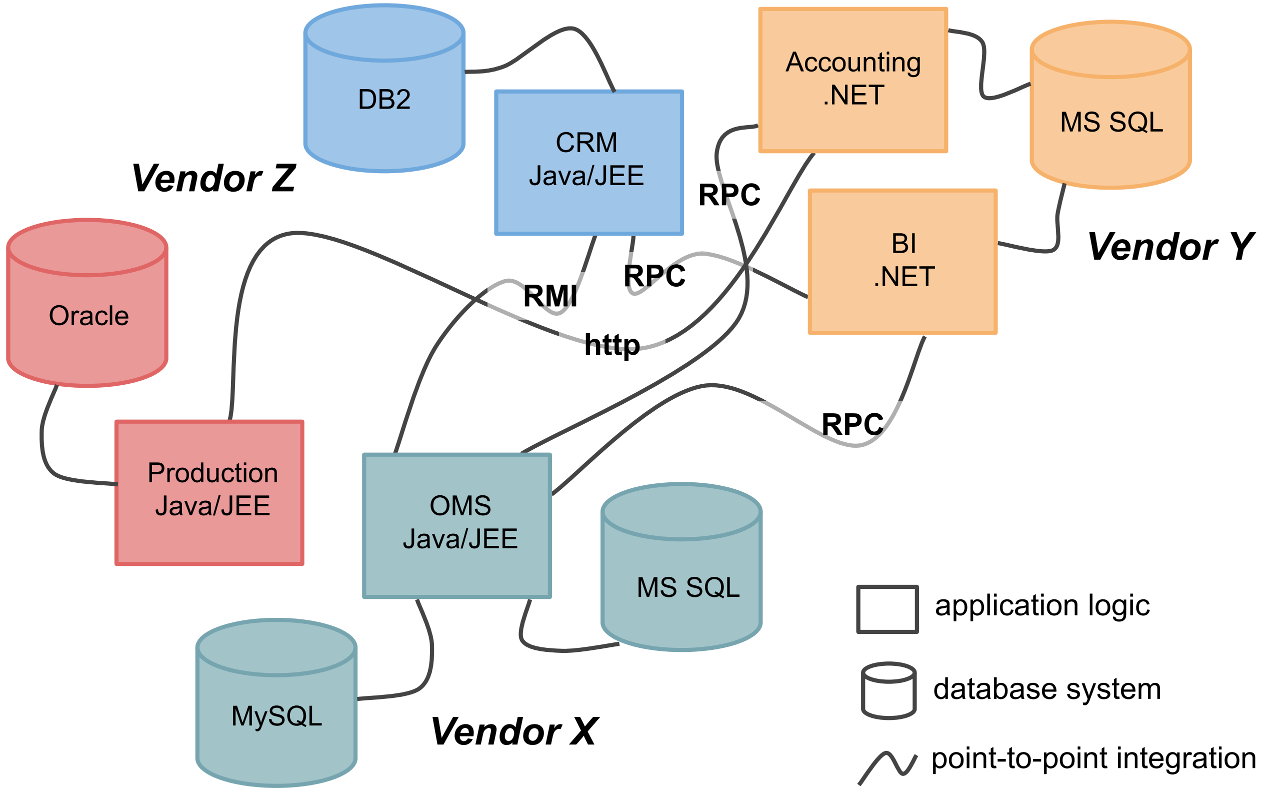
- Course at a Glance
  - *Motivation and Scope*
  - *Requirements and Organization*
- Assessment
- Communication and Resources

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, ...*
- Good performance
  - *frequent changes in applications' loads, peek hours*
  - *scalability – effective load balancing*
  - *low costs – cheaper to outsource?*
- Rapid changes in applications' functionality
  - *modular development*
  - *reuse of application functionality*
  - *low costs – do it now and quickly!*

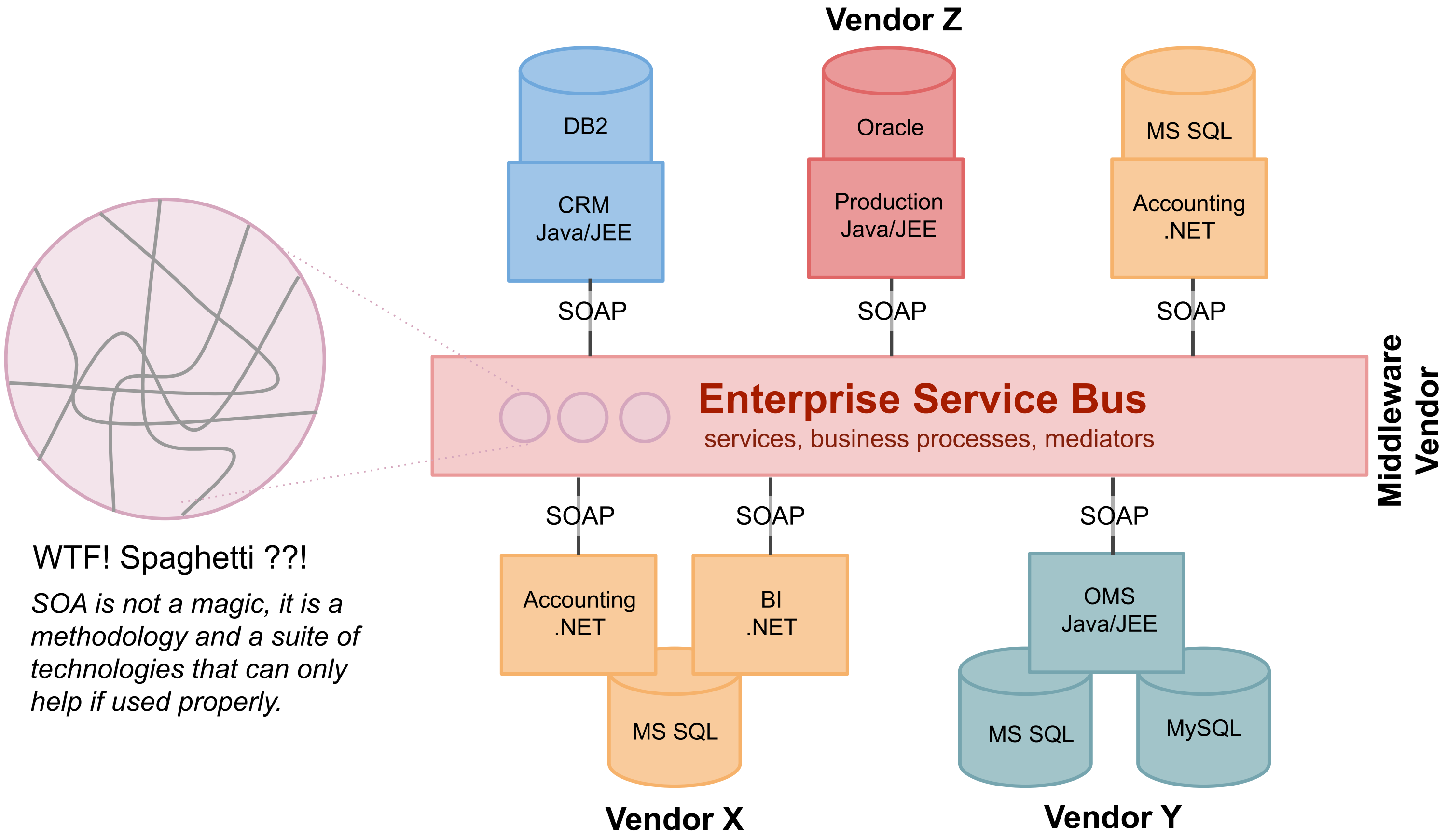
Spaghetti Architecture

- Need for the integration
  - *One-to-one integration*
  - *Hard to maintain, vendor interoperability problem*



SOA Architecture

- Integration organized
  – *Enterprise Service Bus, to be used wisely*



WTF! Spaghetti ??!

SOA is not a magic, it is a methodology and a suite of technologies that can only help if used properly.

Scope

- Architectural and conceptual basis
  - *What is architecture – enterprise, processes, data, software*
  - *Service Oriented Architecture, Service Concepts, Middleware*
- Web Service technologies
  - *Details of HTTP and REST, SOAP*
  - *Web Service Description Language (WSDL)*
- Infrastructure and Middleware
  - *Performance, Scalability*
  - *Application server*
- Cloud Architectures

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. *23.09.2019 – Motivation and Course Overview (html)*
  2. *30.09.2019 – Introduction to Architectures (html)*
  3. *07.10.2019 – Service Architecture (html)*
  4. *14.10.2019 – Representational State Transfer (html)*
  5. *21.10.2019 – Advanced Service Concepts and Technologies (html)*
  6. *04.11.2019 – Application Server Architecture (html)*
  7. *11.11.2019 – Application Server Services (html)*
  8. *18.11.2019 – Integration Patterns (html)*
  9. *25.11.2019 – Messaging Systems (html)*
  10. *02.12.2019 – High Availability and Performance (html)*
  11. *09.12.2019 – Cloud Architectures (html)*
  12. *16.12.2019 – Reserve*

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*

Overview of Resources

- Overview of resources

Item	URL
Course slides	http://mdw.vitvar.com
Courses@FIT	https://courses.fit.cvut.cz/MI-MDW/
Lab projects	https://gitlab.fit.cvut.cz/
Assessment	https://grades.fit.cvut.cz/courses/MIE-MDW.16/

- 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.*
  - *Jon Mountjoy, Avinash Chugh: WebLogic: The Definitive Guide. O'Reilly Media, Inc., 2004*
  - *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*