

Enterprise Architectures

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Information about the course

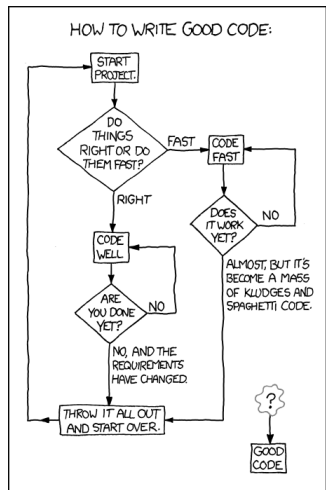


You will learn how to

design enterprise applications using Java web technologies, including pieces of the Java EE stack

implement the applications in Java, Spring, EclipseLink, and ReactJS

think about high-availability, clustering, security, and other stuff ...



source: <https://techcodegeek.wordpress.com>



Teachers

Lecturers:

- Petr Křemen, `petr.kremen@fel.cvut.cz`
- Miroslav Blaško, `miroslav.blasko@fel.cvut.cz`
- Martin Ledvinka, `martin.ledvinka@fel.cvut.cz`

Course Assistants:

- Petr Křemen, `petr.kremen@fel.cvut.cz`
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- Martin Ledvinka, `martin.ledvinka@fel.cvut.cz`
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Course Organization

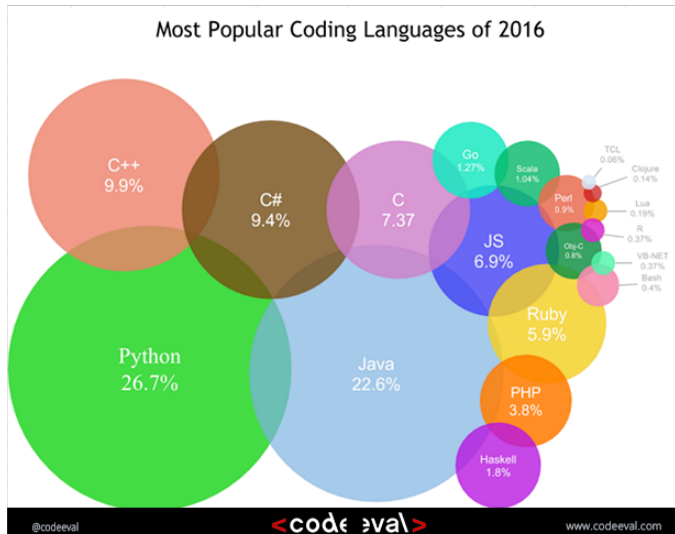
- **Go through**
<https://cw.fel.cvut.cz/wiki/courses/b6b33ear>
carefully, including subsections:
 - Lectures
<https://cw.fel.cvut.cz/wiki/courses/b6b33ear/lectures>
 - Seminars
<https://cw.fel.cvut.cz/wiki/courses/b6b33ear/seminars>
 - Assessment
<https://cw.fel.cvut.cz/wiki/courses/b6b33ear/hodnoceni>
- The course will be split into two parts:
 - Basic topics – lectures 1-7
 - Advanced topics – lectures 8-13



Enterprise Applications



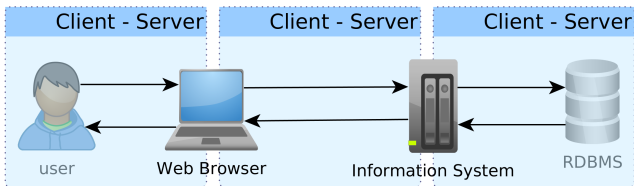
Usage of programming languages in 2016



source: <http://www.codeeval.com>



Client - Server Paradigm



Desktop Application



Desktop Application. Single-user access.



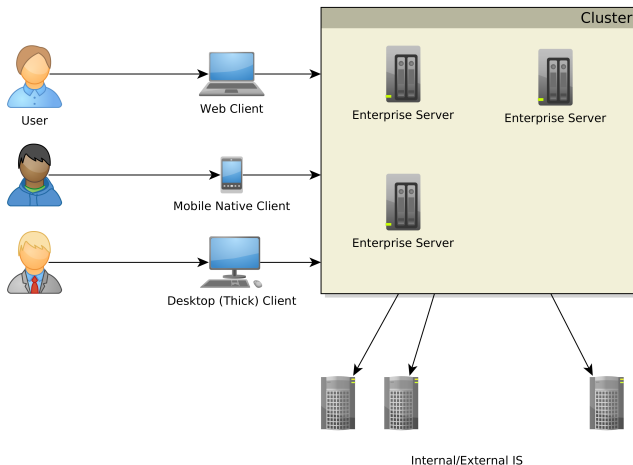
Web Application



Web Application. Multi-user access, single client (web), no integration with other systems.



Enterprise Application (EA)



Web Application. Multi-user access, multiple clients (web, mobile, desktop, terminal ...), integration with other enterprise systems (ERP, DWH, ...).



Multi-tier Architecture

Typically three-tier – presentation logic, business logic, data storage.

Separation of tiers to

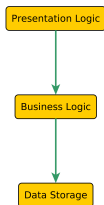
- 1 presentation
- 2 service
- 3 business logic
- 4 data access
- 5 data storage
- 6 ...

Each tier can access only a tier right below (**strict**), or all lower tiers (**relaxed**).

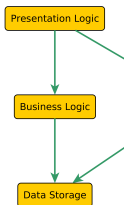


Multi-tier Architecture

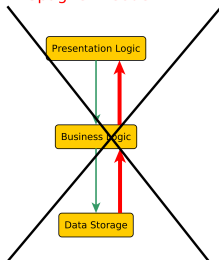
Strict Architecture



Relaxed Architecture



Spaghetti Code



Enterprise Application Architecture

Martin Fowler: Patterns of Enterprise Application Architecture

“... display, manipulation and storage of large amounts of complex data and the support or automation of business processes with that data.”



Enterprise Applications - Requirements

Persistent Data using relational databases, graph databases, NoSQL databases, RDF triple stores,

Complex Data Integration of different volume, accuracy, update frequency, quality and meaning → data integration,

Concurrent Data Access by many users at once with different scenarios (writing, reading different parts of data),

Multiple Input Interfaces involving complex user interfaces (many forms, web pages), (sensoric) data sources, operational data,

Process Automation involving integration with other enterprise applications, batch processing, etc.



Requirements - Details

Data Integration

- Vocabulary/Ontology Management – Enterprise Conceptual Models,
 - SKOS
 - RDF(S),
 - OWL
- Master Data¹ – data spanning the whole enterprise, like *customers, products, accounts, contracts* and *locations*

Integration with other EA

- (Asynchronous) Messaging systems
 - JMS (JSR 343)
- (Synchronous) Remote Procedure Calls
 - RPC
 - RMI
 - CORBA
 - Web Services

¹source: <http://www.ibm.com/developerworks/data/library/techarticle/dm-0804oberhofer>



Vocabulary/Ontology Management – Is It Worth ?

9/11 – One or Two Events ?

... matter of 1 bil. USD

DID YOU KNOW



Just months before 9/11, the World Trade Center's lease was privatized and sold to Larry Silverstein.

Silverstein took out an insurance plan that 'fortuitously' covered terrorism.

After 9/11, Silverstein took the insurance company to court, claiming he should be paid double because there were 2 attacks.

Silverstein won, and was awarded \$4,550,000,000.

source:<https://www.metabunk.org/larry-silversteins-9-11-insurance.t2375>

Use Case – External B2C System (e.g. e-shop, social network)

- Many Concurrent Users
- Web Client
- Relational Database with a simple model
- Enterprise Data Store Integration



Use Case – Internal Enterprise System (e.g. Car Insurance System)

- (Not so many) Concurrent Users – mainly company employees
- Thick client for company employees
- Relational Database, complex domain model capturing enterprise know-how
 - e.g. conditions for obtaining an insurance contract
- ERP, CRM Integration



Performance Testing²

Metrics

response time – server-side request processing time,

latency – client-side request processing time for NOP operation (i.e. for zero response time),

throughput – transactions per seconds,

scalability – sensitivity to resource (hardware) addition/removal,

scaling up (vertical) – add resource (RAM) to one server

scaling out (horizontal) – add more servers

Contextual Information

load – number of requests/transactions

load sensitivity – sensitivity of a metric w.r.t load

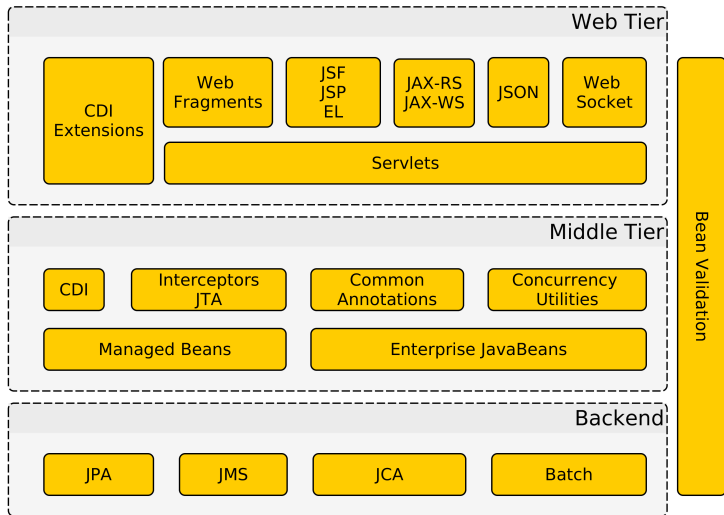
²<https://nirajrules.wordpress.com/2009/09/17/measuring-performance-response-vs-latency-vs-throughput-vs-load-vs-scalability-vs-stress-vs-robustness>



Java EE



Java EE = Java Enterprise Edition



Technologies Used in This Course

JPA (EclipseLink) (∈ Java EE stack)

Websockets (∈ Java EE stack)

Servlets (∈ Java EE stack)

Spring (provides similar functionality as Enterprise Java Beans, CDI, Common Annotations and other)

→ Apache Tomcat

ReactJS (modern JS-based UI system, more flexible alternative to JSF)

→ NodeJS (only for efficient compilation)



Alternatives

Spring	vs.	Java EE Session Beans
EclipseLink	vs.	Hibernate, OpenJPA
ReactJS	vs.	JSF
ReactJS	vs.	AngularJS, ExtJS

