

# Development of database applications in Java

Course code: JAVADB

The course focuses on the access of Java applications to the database. In the course, we will first look at the low-level approach to working with the database using JDBC & JdbcTemplate, which is especially suitable for batch processing, then what programmers should know about SQL so as not to swear that the database is slow (usually not, it is poorly used), but we will mainly focus on the efficient use of the database using JPA and Spring Data JPA.

## Required input knowledge

- The course assumes knowledge and experience with programming in Java at the level of the JAVAPROG2 and JAVADB course

## Teaching methods

- Expert explanation with practical examples, exercises on computers.

## Studying materials

- Printed presentations of the subject matter.

## Course syllabus

# Course syllabus

### JDBC & JdbcTemplate

- HikariCP
- Connection pool settings
- Batch update
- Soft parsing vs. hard parsing
- SQL query optimization
- Execution plan
- Indices

### JPA Entity

- Types (Primitive, String, Date & Time, Numeric, Binary, UUID, ...)
- Generate primary key value

### Links between entities

- @OneToMany, @ManyToOne, @OneToOne, @ManyToMany
- Fetching strategy
- FetchType.EAGER Vs. FetchType.LAZY
- Bidirectional & unidirectional ties
- N + 1 problem
- LazyInitializationException
- Open Session In View Anti-Pattern
- join fetch, JPA entity graph

### Transaction

- ACID
- Why (not) use two-phase commit
- Flush mechanism & when flush operation occurs

### Other JPA topics

- HQL (Hibernate Query Language)
- Different inheritance strategies: single table, join table, table-per-class
- JPA Batching insert / update / delete operations
- Logging of SQL operations
- Pageable & Sort

#### GOPAS Praha

Kodářská 1441/46  
101 00 Praha 10  
Tel.: +420 234 064 900-3  
[info@gopas.cz](mailto:info@gopas.cz)

#### GOPAS Brno

Nové sady 996/25  
602 00 Brno  
Tel.: +420 542 422 111  
[info@gopas.cz](mailto:info@gopas.cz)

#### GOPAS Bratislava

Dr. Vladimíra Clementisa 10  
Bratislava, 821 02  
Tel.: +421 248 282 701-2  
[info@gopas.sk](mailto:info@gopas.sk)



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# Development of database applications in Java

- Criteria API & Query DSL
- Spring JPA Data & custom methods on JpaRepository interface
- Spring Data REST

## Caching

- Database level caching
- First level cache, second level cache

## Locking

- Pessimistic & optimistic locking

### **GOPAS Praha**

Kodaňská 1441/46  
101 00 Praha 10  
Tel.: +420 234 064 900-3  
[info@gopas.cz](mailto:info@gopas.cz)

### **GOPAS Brno**

Nové sady 996/25  
602 00 Brno  
Tel.: +420 542 422 111  
[info@gopas.cz](mailto:info@gopas.cz)

### **GOPAS Bratislava**

Dr. Vladimíra Clementisa 10  
Bratislava, 821 02  
Tel.: +421 248 282 701-2  
[info@gopas.sk](mailto:info@gopas.sk)



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