

# CS489 – Applied Software Development

## Final Exam: Structure and Review Points

The Final Exam will consist of questions given in 2 parts, as follows:

**Part 1: Theory** – This part will be composed of Knowledge-based questions, including Short answer questions, True/False questions (some will require given a rationale), Multiple-Choice questions and some short/small coding questions.

### **Part 2: Software Development skills – Application Coding / Problem solving**

This part will be composed of question(s) requiring Object-oriented Software requirements analysis, domain modeling, design and implementation tasks.

Part 1: Not more than 40%

Part 2: At least 60%

The Exam will be all computer-based. i.e. You will use computers for both parts 1 and 2.

The exam duration will be 2.5 hours (timed from 10 am to 12:30 pm).

The following are the relevant lessons/topics and sample questions:

## Lesson 6: Data Persistence

### Topics / Sample Questions :

1. What is Data Persistence
2. Database
3. JDBC
4. Java Persistence API (JPA)
  - 4.1.JPA Annotations
    - 4.1.1. @Entity
    - 4.1.2. @Id
    - 4.1.3. @GeneratedValue – strategy: GenerationType.AUTO, GenerationType.IDENTITY, GenerationType.SEQUENCE etc.
    - 4.1.4. Data Validation
      - 4.1.4.1. Database Column Constraints –
        - 4.1.4.1.1. @Column(nullable=false)

- 4.1.4.2. Bean validation annotations:
  - 4.1.4.2.1. @NotNull – null value is invalid, empty string "" is valid
  - 4.1.4.2.2. @NotEmpty – null value and empty string "" is invalid
  - 4.1.4.2.3. @NotBlank - null, empty string "" and whitespace(s) is invalid
- 4.1.5. @OneToOne
- 4.1.6. @OneToMany and @ManyToOne
- 4.1.7. @ManyToMany (results in creating a Join Table)
- 4.1.8. @Transient
- 4.2....
- 4.3....
- 5. Hibernate – ORM framework that implements the JPA specification
- 6. Spring Data JPA – the dependency in Spring platform for Data persistence using JPA.
  - 6.1.
- 7.
- 8. ...

Lesson 7: RESTful Web API Development

Lesson 8: Full-stack Application Devt

Lesson 9: Security

Lesson10: Containers and Containerization

Lesson 11: Software Testing

Lesson 12: Software Deployment / Azure Cloud service

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Please note that you are expected to have and apply knowledge of topics in the following prior lessons where needed, though this Final Exam will not be targeted at testing that knowledge, directly.

Lesson 1a: Software Development tools

Lesson 1b: Software Build Automation

Lesson2: Software Requirements, Analysis and Design / Domain modeling

Lesson3: Software Development Platforms

Lesson4: Architecture

Lesson5a: Databases I (Relational Database design and development)

Lesson5b: Databases II (Non-relational Database a.k.a NoSQL database – MongoDB)

**Note:** *For some of the questions/tasks in the part 2 of the Exam, you will be expected to take screenshot(s) of your work/result(s), and save them to an image file (.png or .jpg or .jpeg only) and include these in the zip file, which you will submit.*

***Also, when you take the screenshots, it should be of the entire computer screen (NOT a snippet or a window)***

**//-- The End --//**