

# Design and Implementation of Internet Applications – 2017-2018

Final test

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Notes: You can use a single handwritten sheet of paper.

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You were selected to develop the next Q&A platform for the next WebSummit event in Lisbon. WebSummit comprises 20 different conferences, and hosts more than 50,000 participants. The commissioned platform will provide the program of the several conferences taking place, and allows for the participants to check-in to conference sessions and ask questions to the speakers. The pre-condition to submit a question in a session is that, a participant must be registered to the general WebSummit conference, have performed the check-in and be on the location to do it. The platform you are designing follows a service-based architecture, making data available to clients which are independently developed. Consider the following user stories :

1. A user registers himself for the conference and sees its personal details.
2. A registered user updates its personal details and sees the modifications in its landing page in the application.
3. A registered user opens the application and sees the sessions of all conferences sorted by starting time and active for a given day (default is the current day).
4. A registered user opens the application and sees the list of conferences with active sessions for a given day (default is the current day).
5. A registered user opens the application and sees the list of sessions in his personal program (favourite and checked-in sessions).
6. A registered user selects a conference from the conference list and sees its list of sessions.
7. A registered user checks-in into a session of a conference and sees the the talk and speaker details.
8. A registered user marks a session as favourite and sees it in its personal program.
9. A user, when checked in a session, and being on site, submits a question to be asked to the speaker at the end of her talk, and sees the list of questions already submitted.
10. A user, when checked in a session, and being on site, sees the questions submitted for that session.
11. A user, when checked in a session, and being on site, marks a "like" in a question submitted for that session.

Notice that these user stories refer to the UI of an application that you are not designing in this test.

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**Q-1 [6 val.]** This question is about the definition of a service-based application, using the REST architectural style, Java Spring, and JPA.

- a) **[3 val.]** Define the necessary resources, operations, and parameters that are needed to (strictly) implement the user stories above. State the essential URLs, method (GET, POST, etc.), parameters, and a response description (e.g, is it a list, an element, of what type, what's the encoding?).
- b) **[3 val.]** Define the data model of the application using JPA annotations and a set of classes. Be sure to represent the relations between entities with JPA relation annotations. It is not necessary to list getters and setters.

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**Q-2 [6 val.]** This question is about the implementation of business logic in an application as the one described in Q-1.

- a) **[3 val.]** Define and implement controller methods for user stories 5 and 7. Declare the method annotations, signatures, and code. Define and implement auxiliary services and repository methods to achieve the best possible solution in terms of correctness, efficiency, and modularity, as covered in the course lectures.
- b) **[3 val.]** Define a repository method to support a controller method implementing user story 10. Provide the best possible solution in terms of correctness and efficiency.

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**Q-3 [6 val.]** This question is about the implementation of security policies at the level of a service based application.

- a) **[2 val.]** Justify the advantage of having a data dependent model based access control as presented in the course lectures. Compare it with the security models proposed by standard role-based access control model, and the actual Spring role implementation.
- b) **[3 val.]** Define the controller methods' signatures and security annotations for the user stories 5, 8, 9, and 10 in Q-1. Define and implement auxiliary services to implement data dependent access policies.

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**Q-4 [4 val.]** This question is about the comparison between frameworks.

- a) **[2 val.]** Justify what are the main criteria to choose a framework to develop server-side internet applications. For each of those criteria compare two frameworks, one that excels in that category and another that does not cover the requirements.
- b) **[2 val.]** Compare and Justify the use of low-code platforms, frameworks, and libraries.