Design and Implementation of Internet Applications – 2018-2019

Midterm test   October, 30, 2018 (18h-19h30)

Name:_____   Number:_____

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Notes: You can use two handwritten pages of notes. No human or electronic help is allowed.

During your hiring process to work at NetFlix, you are asked to develop a small prototype cloning some of the back-end core features of the company's web application.

Your assignment consists of giving access to video **content items** that are described by a title, a description, and a URI for its stream content (outside of scope of this assignment). Associated to a content item there is a list of tags. It's also your job to define a search feature that looks for substrings in the title and description, but also uses names of **tags and keywords associated with them**. A tag has a name, and may be associated to many content items, **it also has a series of keywords** that help with the search process. Each keyword is exclusively associated to a particular tag.

The **users** of the system, identified by a username, **declare their preferences by associating tags** to their profile, that are used to showcase content to users. A user may also mark **a set of content items as favorite**, and has access to **a viewing history** that tells when a certain content was requested.

Q-1 [4 val.]   This question is about the definition of a RESTful API.

a) [2 val.]   Define the necessary resources and operations needed to implement the operations below. State the needed URLs, method (GET, POST, etc.), parameters, and responses.

   (a) List all content items with search and pagination options.

   (b) List the tags associated to a content item.

   (c) Retrieve a content item given its identifier.

   (d) List the preferences of a user identified by a username.

(e) List the viewing history of a user identified by a username for the last month.

(f) Mark a content item as favorite.

(g) Add a new tag to the user preferences.

(h) Remove a content item from the favorite list of a user.

b) [2 val.] Explain the advantages and disadvantages of using a framework like OpenAPI/Swagger in the development of a Web API.

Q-2 [3 val.] Define the data model of the application using JPA classes. Be sure to represent the relations between entities with JPA relation annotations. It is not necessary to list getters and setters, or parameters of the associations.

Q-3 [4 val.] This question is about the implementation of the business logic of the application.

a) [2 val.] Define and implement controller methods for operations (d) and (g) described in Q-1 a). 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.

(d) List the preferences of a user identified by a username:

(g) Add a new tag to the user preferences:

b) [2 val.] Define a repository method to support a controller method (partially) implementing operation (a) defined in Q-1 a). **Focus the search on matching the keywords of a tag of a content.** Provide the best possible solution in terms of correctness and efficiency.

Q-4 [5 val.] This question is about the creation of test fixtures and sample data for tests. Your mission in this question is to test operation **(h) – Remove a content item from the favorite list of a user**.

Consider the header of the class:

```
@RunWith(SpringRunner.class)
@SpringBootTest
public class FavoriteMoviesTests {

    @Autowired
    private WebApplicationContext wac;

    ... // repositories

    private MockMvc mockMvc;
```

a) [2 val.] Implement the initializer method so that there is enough data on the test database to test the operation. Refer to repositories and setters and getters freely.

```
@Before
public void init() {
    this.mockMvc = MockMvcBuilders.webAppContextSetup(this.wac).build();

    // Data Fixture
    ...
```

b) [3 val.] Implement one test method for operation (h) referred above.

```
@Test
public void testDeleteFavorite() throws Exception {
```

Q-5 [4 val.] This question is about the implementation of security policies at the level of a service based application.

a) [1 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.
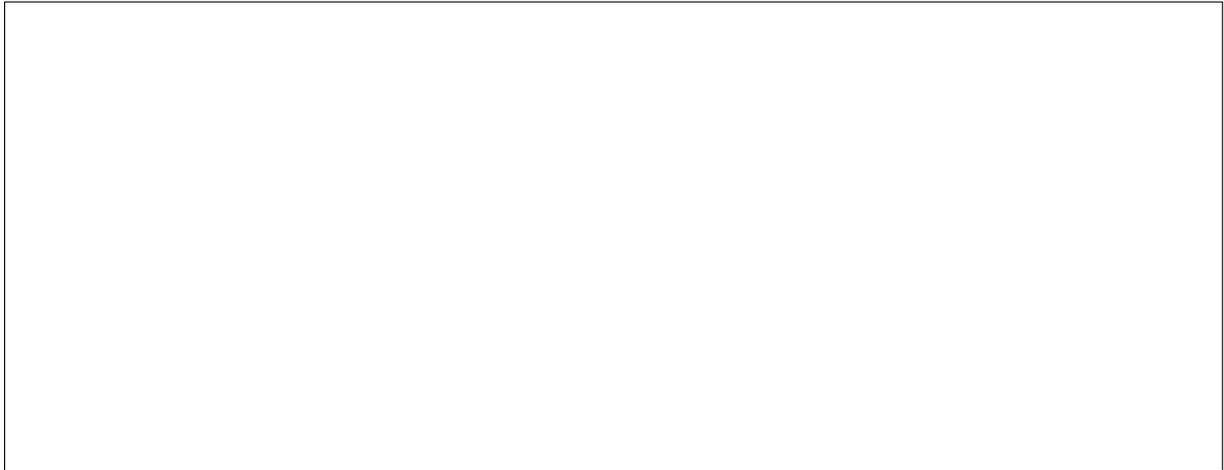
b) [3 val.] Refine your implementation of the controller methods for operation (g) from Q-1a), with signatures and security annotations.

Define and implement the annotations and auxiliary services to implement data dependent access policies.
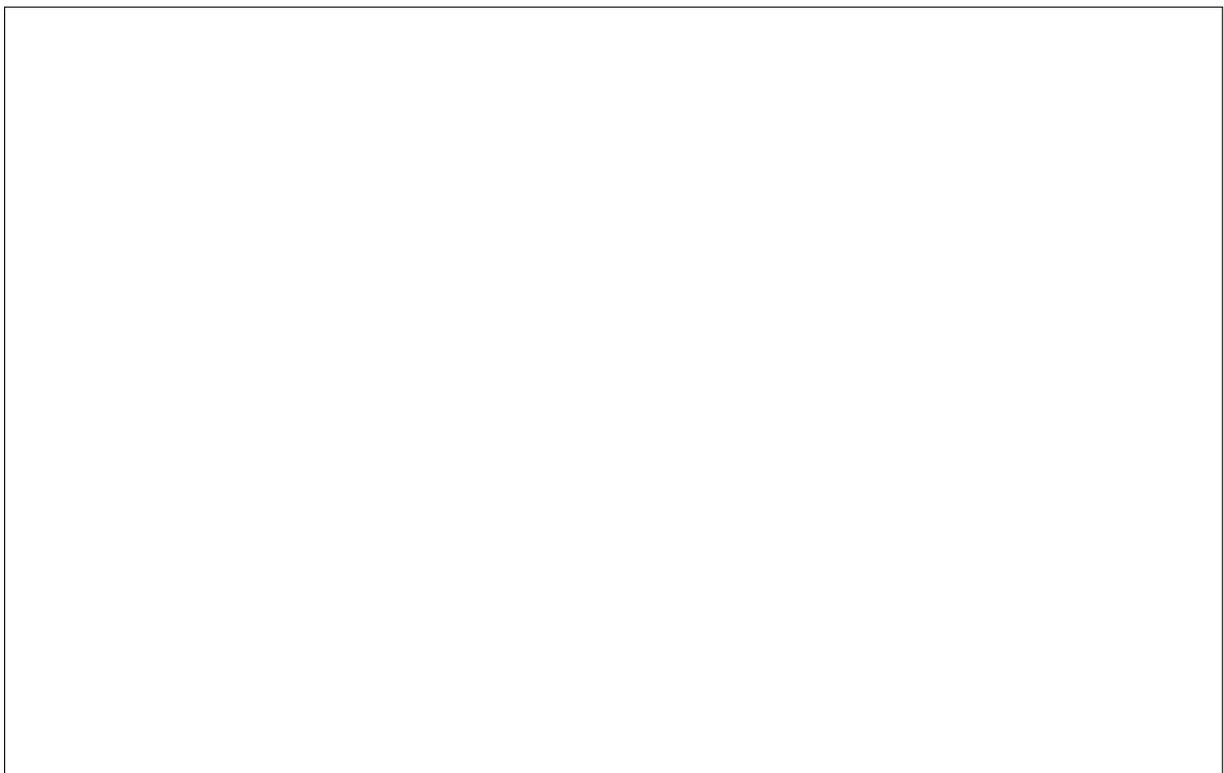
(this scratch page can be removed but must be identified and submitted in the end.)

Student number: _____