Internet Application Design and Implementation
2015 - 2016

Test 2

9 December 2015

Consider an Internet-based application that implements a family shared shopping list. On this application, one can create shopping lists, add items to a list (with a description, a quantity, and an expected price tag). One can also share shopping lists with other users. Hence, a list is related to a set of users. Shopping lists are private, hence a registered user can only see the items and lists related to her. Users may have different rights granted over a list: owner, admin, write, read. Rights are ordered from owner (high) to read (low) in the order presented. Only members with admin rights (or higher) can share a list, and allow granting rights equal or lower to their own. Only users with owner rights over a list can delete a list. The list of users is visible to all registered users.

You should answer the questions using Java code under the Spring (Spring Boot, Spring Data) framework, and UML, whenever applicable. Answer each group in a different sheet of paper (use as many as you need). Identify each sheet you want to be evaluated with your name and student number. You may use one handwritten sheet of paper with your personal notes (both sides). The duration of the test is 1h30m.

Group 1

This group is about the data model of the application, regardless of access control.

1 Define the UML model of the scenario described above (Shopping List). Include all the entities related to user and access model.

2 Define the JPA entity model that corresponds to the model of question 1. Include all the annotations that represent the relations between entities.

3 Sketch a JSON based controller class to manage a shopping list of a given user. List all controllers and corresponding parameters, to be able to show a list and its list items, complete an item, and delete a list. Refer to the JPA methods (by its signature) of the repositories that are needed to access the entities.

Group 2

This group is about the security aspect of an application, which is one of the important factors for the use of frameworks to develop web applications. A module of Java Spring such as Spring Security provides an implementation of an access control model.

1 Describe the generic *Role Based Access Control* Model, and compare it to the basic model implemented by Spring Security.

2 List the principals of the scenario above, and the authorities/capabilities (according to spring security mechanisms) that are needed to implement the implied security rules.

3 List the different resources involved in the application and the corresponding controllers that are needed to implement a RESTful interface (only URLs, method signatures, and annotations). Include the necessary `PreAuthorize` annotations as prescribed to implement the security rules described above. If necessary, also use model based abstractions (in specially designed services).

Group 3

1 Discuss the advantages of decoupling the data model from the client applications (web or native mobile) using web services (JSON or XML based).

2 Give an example of client code (Javascript, AngularJS, or Dart) that lists the items of a list, and allows to complete one list item. (Refer to the services described in Group 1.)

3 Discuss the advantages and disadvantages of using client side frameworks (like AngularJS) or languages (like DART or TypeScript).