MTAT.03.295 – Agile Software Development
Regular Exam – 08 January 2020
Part 2

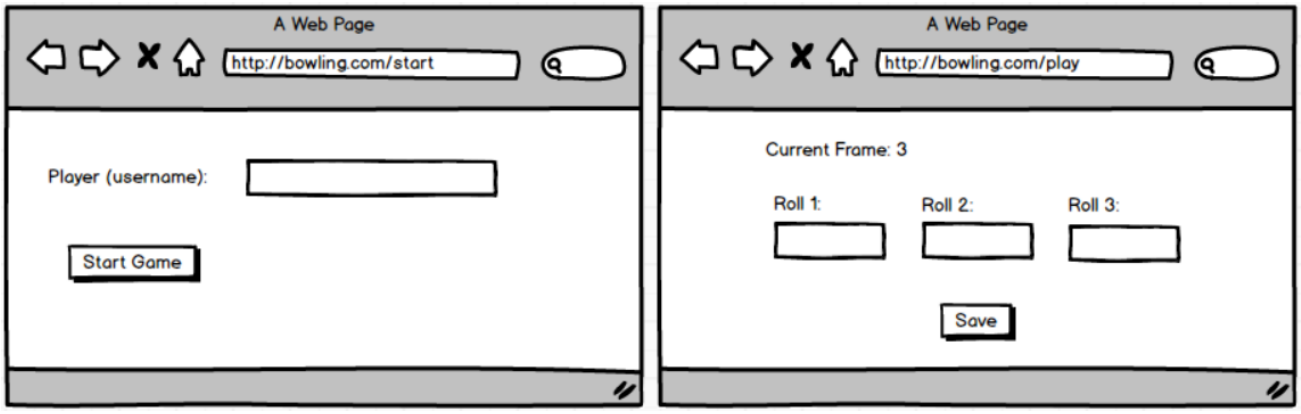
Notes:

- You are allowed to access any resource in the web
- You are not allowed to communicate with anyone during the exam in any way (except with the lecturer).
- You must create a Bitbucket repository and add me there as a collaborator (with admin rights). Push changes on your solution as frequently as possible, so as to demonstrate that you followed the BDD-TDD cycle in your work.
- If you find that some information is inaccurate and that you need to make some additional assumptions, please write them down (you can add them as a README file in your root folder on your Bitbucket repository).

Bowling Championship

Bowling is a popular sport in which a group of players take turns to roll a bowling ball on a wooden lane towards a group ten pins at the end of the lane. The goal of the game is simply to knock down as many pins as possible. In the simplest case, scoring a bowling game consists on adding the number of pins that a player knocks throughout the game. Each player is given up to two opportunities (or three in the last frame) to knock the 10 pins down in what is called a frame.

A bowling game consists of 10 frames and each frame is scored individually. The score for the frame is the total number of pins knocked down, plus bonuses for *strikes* and *spares*. A spare is when the player knocks down the 10 pins in the two rolls of a frame. In the case of a spare, the score for the frame is 10 plus the number of pins knocked down in the first turn of the next frame. A strike is when the player knocks down all 10 pins on the first roll of a frame. In the case of a strike, the score for the frame is 10 plus the number of pins knocked down in the next two turns. As a consequence of the scoring rules for spares or strikes, a player could get to roll three times in the tenth frame. However, no more than three balls can be rolled in the tenth frame.



For first release of the software, we will implement a Phoenix application to save the data of a bowling game. The product manager has agreed with the customers on the wireframes above that illustrate the underlying process.

Each player is allowed to play only once, so the username will serve as the identifier of the corresponding game. In the first form, a player introduces his/her username, and the system will create a new game if the user hasn't played yet. Otherwise, the system will notify the user that he/she isn't allowed to create a new game. Once the game is created, the system redirects the player to the second form, which allows him/her to introduce the data of the corresponding frame. Note that, for new games, the current frame will be 1. When the player saves the data of the current frame, the system must update the information in the database and allows the player to introduce the data of the next frame. For example, after saving the data of frame 1, the system redirects the player to the view corresponding to frame 2, and so on until the game is completed. After saving the data in frame 10 (where the game is completed), the system will display a message notifying the player that the game is completed, and including the score obtained for the player.

The system must satisfy the following restrictions:

1. Only one game is allowed per player. Thus, when creating a game, the system will display a message notifying a player about the existence of a game if the username already played. In new games, the system redirects the player to the view corresponding to the frame 1.
2. The system should allow saving the information of a frame by providing the frame number, and the number of pings (between 0 and 10) knocked in each roll. Besides, the sum of pins knocked in the two first rolls can't be greater than 10.
3. The number of pings in roll 3 can be greater than 0 only in frame 10, and if the player scored a spare or a strike in that frame. In other words, in frames 1, 2, …, 9 the value of the roll 3 must be 0.
4. The system must display a message with the total score when the game is completed, which is calculated based on the rules described above (total of pings knocked plus bonuses for spares and strikes). In frames 1, 2..., 9 the system must automatically redirect the player to the next frame.

The task breakdown and corresponding marks are as follows:

- (BDD) Specification of a Gherkin user story capturing the updates of the data in the last frame (frame 10) and the displaying of the score as a message. (**4 pts**)
- (BDD) Implementation of the white_bread steps. (**3 pts**)
- Setup of the application routes. (**2 pts**)
- Setup & implementation of models (via migrations), and seeding the database with some initial data based on your models. (**5 pts**)
- Implementation of controllers. (**10 pts**)
- Implementation of views and templates. (**3 pts**)
- (TDD) Unit tests for either models / controllers checking the restrictions 1, 2, 3 and 4. Note that a single test may include several requirements. (**8 pts**)