Assignment 1
Bubble Spinner Group 20

Contents

1. Functional requirements

The required functionalities of the Bubble Spinner game are listed below, prioritized according to the principles of the MoSCoW method.

1.1 Must have

- The game shall show the user a start screen, which offers the options to create a new account or log into an already existing one.
- The player shall be able to sign up with a unique username and password.
- The game shall store usernames and encrypted passwords in a database.
- The player shall be able to log into their account, using the password and username they choose.
- The game shall authenticate login attempts via a database.
- The player shall not be able to start a new game without being logged into an account.
- The player shall be able to start a new game, after successfully logging in.
- The game shall instantiate a hexagonal centerpiece of 20 bubbles of randomized colors (this is the bubble structure for the first level).
- The game shall provide five different colors of bubbles.
- The game shall display a bubble of randomized color at the bottom of the screen, once a new game is started.
- The game shall display an arrow at the bottom of the screen, once a new game is started.
- The player shall be able to rotate the arrow by moving their cursor in order to aim at the clustered bubbles.
- The player shall be able to shoot a bubble by clicking the left mouse button.
- The game shall rotate the bubble structure on collision with a player-fired bubble, either clockwise or counterclockwise depending on the hit direction.
- The game shall regenerate new bubbles of randomized color for the player to shoot.
- The game shall stop a shot bubble from moving when it hits the centerpiece and attach it to the cluster. This may trigger elimination of bubbles.
- The game shall eliminate a chain of at least three same-colored bubbles that is formed after a bubble that is shot by the user collides with, and attaches itself to, the centerpiece.
- The game shall not eliminate chains of same-colored bubbles when they are not formed by the player shooting at the centerpiece.
- The game shall eliminate bubbles that get detached from the structure as an effect of other bubbles being eliminated.
- The game shall let bubbles bounce off of edges of the board.

- The game shall let bubbles expire when they have not collided with the centerpiece within ten seconds after being shot by the user.
- The player shall be able to earn points by eliminating bubbles. Each bubble in the central structure is worth ten points. Bubbles added by the player are not worth any points.
- The player shall be able to earn extra points by winning a level within a within a certain time frame. For the first level, this bonus will be computed as:
  (300 seconds - seconds needed to win level) * 0.5 points.
- The game shall keep track of time needed to complete a level.
- The player shall be able to see their current score while playing.
- The player shall be able to see an accurate timer while playing.
- The player shall win a game when all bubbles in the central structure have been eliminated.
- The player shall lose when a bubble of the central structure hits an edge of the map.
- The player shall be able to enter the name they want to save together with the just recorded score, after a play has ended.
- The game shall store scores in a database, together with the name entered by the user.
- The game shall display the top five scores that have ever been recorded, at the end of each play.

1.2 Should have

- The player shall be able to pause an ongoing game.
- The player shall be able to resume a paused game.
- The player shall be able to quit an ongoing game.
- The player shall be able to end a game by either losing or deciding to quit
- The game shall start the first level when the player starts a new game.
- The player shall be able to start the second level after winning the first one .
- The game shall offer a second level with a more complex bubble structure.
- The game shall fire three randomized bubbles at the centerpiece in the second level, each time the player makes ten shots.
- The game shall provide a manual which explains the game rules.
- The game shall provide a simple achievement system where players are rewarded with badges.
- The player shall be able to earn badges by fulfilling activities such as starting five new games or winning the first level.
- The player shall be able to view their earned badges.
- The player shall be able to change their username and password.

- The player shall be able to earn extra points by eliminating a large chain (consisting of at least five bubbles) at once. The bonus for five adjacent bubbles is ten points. Each additional bubble in the chain is worth five extra points.
- The player shall be able to distinguish bubbles not only by shape, but also by a shape placed at the centre of the bubble.

1.3 Can have

- The game shall provide a friendship system:
    - The player shall be able to find their friends by username.
    - The player shall be able to send friend requests.
    - The player shall be able to accept or decline friend requests.
    - The player shall be able to remove friends.
    - The player shall be able to view the scores and achievements of their friends in a leaderboard.
- The player shall be able to see:
    - how many games they have played.
    - their overall score.
    - their current level
    - how many times they won/lost.
- The game shall provide a more complex achievement system.
- The game shall play sounds effects when bubbles collide and when a game is lost or won.
- The game shall provide different game modes:
    - Default: The player can play different levels that increase in complexity.
    - Time trial: The players has limited time to earn points. The game terminates when the time is up.

1.4 Won’t have

“Can have” requirements that will turn out to be infeasible to implement, shall be moved to this paragraph.

- The game shall offer multiplayer mode.

2. Non-functional requirements

In addition to the functionalities of the game, a list of requirements regarding the software development is provided here.

2.1 Product requirements

- The game shall be protected against code-injection by using prepared statements.
- The game shall not store personal user information as plain text.
- The game shall not automatically increment user IDs, but shall generate new ones using randomization instead.
- The player shall be able to start a new game within five mouse clicks.
- A new player shall be able to play a game after reading the manual.

2.2 Organizational requirements

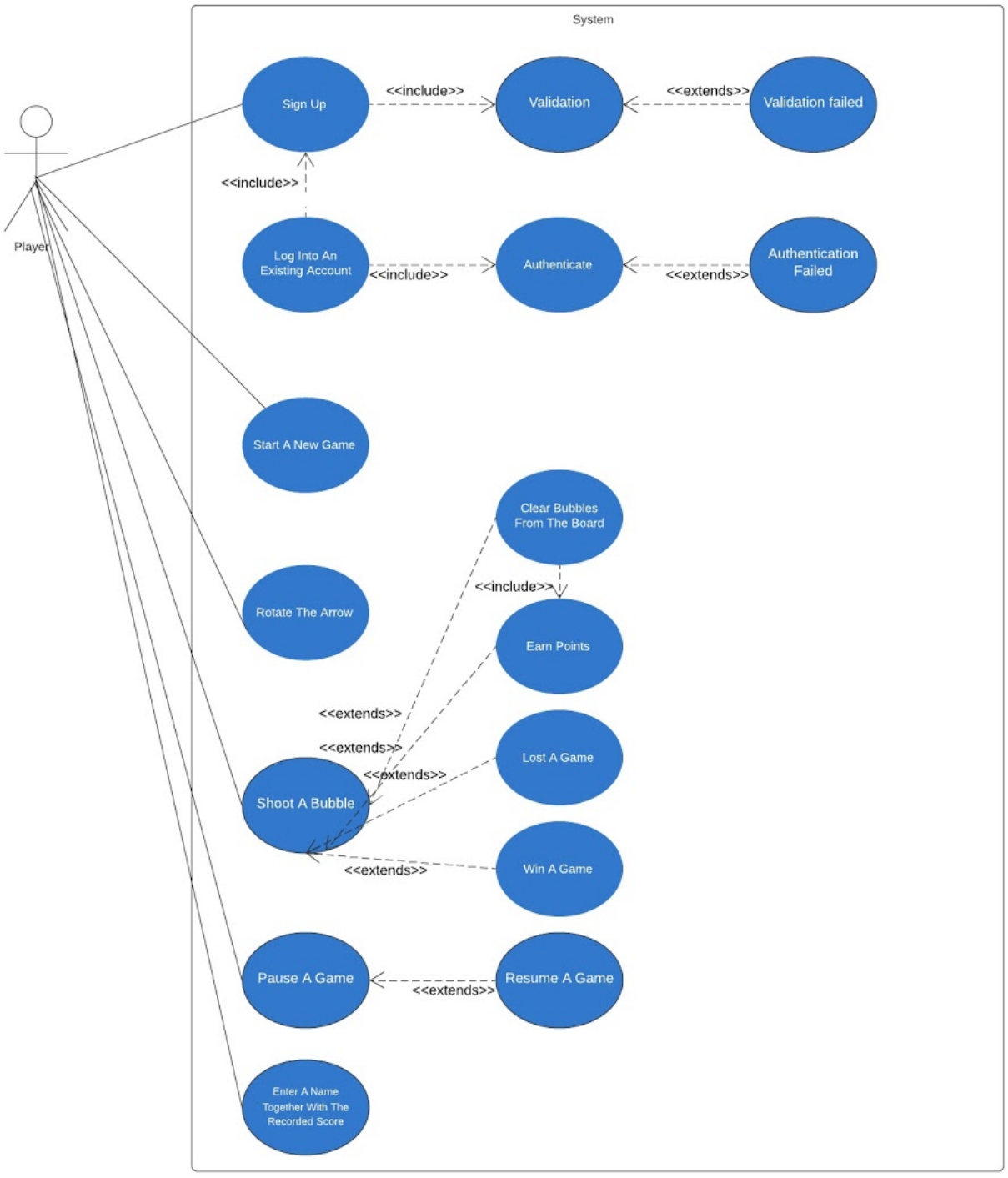
- The game shall be finalized at January 24, 2019.
- The game shall be implemented in Java.
- The game shall be implemented using the libGDX library.
- The game shall connect with the database using JDBC and retrieve and store data with SQL queries.
- The game shall be playable on Windows 7 (or higher).
- The game shall be developed in a process conforming to the scrum guidelines.

2.3 External requirements

- The game shall be accessible for colorblind users.

3. Use cases

3.1 Use case diagram



3.2 Use case descriptions

Use Case 1) Signing up and logging in

Purpose: Enable a player to play the game with his/her own game account.
Created on 27/11/2019

Overview: As a player, after starting the application I see the start screen which displays the options to sign up or log into an existing account. I click on the sign-up button where I can enter a unique username and password. The database will validate if the username has not been used before. The player will be notified if the username is already taken. If I am an existing user (after having signed up), I go to the login screen where I need to enter my username and password. If and only if the database validates the correctness of my credentials I will be signed in; otherwise I have to try again. After signing in, I can see the splash screen of the game.

According to requirements:

- The game shall show the user a start screen, which offers the options to create a new account or log into an already existing one.
- The player shall be able to sign up with a unique username and password.
- The player shall be able to log into their account, using the password and username they choose.
- The game shall authenticate login attempts via a database.
- The player shall not be able to start a new game without being logged into an account.

Actors:

- Primary actor: player
- Secondary actor: database

Pre-conditions:

- The database should be connected to the game.

Post-conditions:

- The user is logged in.

Use Case 2) Starting a new game

Purpose: Be able to start a new game after logging in.
Created on 27/11/2019

Overview: As a player (Primary Actor), once I'm logged in I see the Game Start Screen. From where I would be able to click the start button. And then the screen transits to the Game screen and a new game starts.

According to requirements:

- The player shall be able to start a new game, after successfully logging in.

Actors:

- Player

Pre-conditions:

- The user should be logged in.

Post-conditions:

- The game screen is showing.

Use Case 3) Aiming with the arrow

Purpose: To enable player rotating the arrow.
Created on 28/11/2019

Overview: After a game has been started, as a player (primary actor), I want to use my mouse to aim before shooting a bubble, An arrow shall rotate towards the mouse position to help with aiming.

According to requirements:

- The game shall display an arrow at the bottom of the screen, once a new game is started.
- The player shall be able to rotate the arrow by moving their cursor in order to aim at the clustered bubbles.

Actors:

- Player

Pre-conditions:

- There is an ongoing game.
- There is a cursor on the game window.

Post-conditions:

- The arrow points to the cursor.

Use Case 4) Shooting bubbles

Purpose: To enable player shooting a bubble, and therefore earning points from popping bubbles, winning or losing the game.
Created on 28/11/2019

Overview: After a game has been started, as a player (primary actor), I want to shoot a bubble towards my target (if the bubble hits the edge of the screen it is reflected), if I line up 3 or more bubbles, the bubbles should pop and I got points according to the number of bubbles. I win the game if there are no bubbles left before the timer runs out. I lose when a bubble of the central structure (the bubble cluster) hits the edge of the screen.

According to requirements:

- The player shall be able to shoot a bubble by clicking the left mouse button.
- The game shall rotate the bubble structure on collision with a player-fired bubble, either clockwise or counterclockwise depending on the hit direction.
- The game shall stop a shot bubble from moving when it hits the centerpiece and attach it to the cluster. This may trigger elimination of bubbles.
- The game shall eliminate a chain of at least three same-colored bubbles that is formed after a bubble
- The player shall be able to earn points by eliminating bubbles. Each bubble in the central structure is worth ten points. Bubbles added by the player are not worth any points.
- The game shall let bubbles bounce off of edges of the board.
- The game shall let bubbles expire when they have not collided with the centerpiece within ten seconds after being shot by the user.
- The player shall win a game when all bubbles in the central structure have been eliminated
- The player shall lose when a bubble of the central structure hits an edge of the map.

Actors:

- Player

Pre-conditions:

- There is an ongoing game.

Post-conditions:

- If the shooting bubble hits the edge of the screen it is reflected.
- If the shooting bubble hits the central structure and there are at least 2 neighboring bubbles of the shoot bubble on the central structure with the

same color, then these bubbles get eliminated and the player earns points according to the number of bubbles got eliminated.
- If the shooting bubble hits the central structure and there are less than 2 neighboring bubbles of the shoot bubble on the central structure with the same color, the shoot bubble attaches to the central bubble cluster.
- If the central structure hits the edge of the screen, the player loses the game.
- If all the bubbles from the central structure get eliminated, the player wins the game.

Use Case 5) Pause and resume the game

Purpose: To pause and resume the game after a game starts.
Created on 28/11/2019

Overview: As a player (primary actor), I can pause an ongoing game after a game has been started and I can resume the game after a game has been paused.

According to requirements:
- The player shall be able to pause an ongoing game.
- The player shall be able to resume a paused game.

Actors:
- Player

Pre-conditions:
- There is an ongoing game.

Post-conditions:
- The game should be paused if it was not.
- The game should resume if it was paused.

Use Case 6) Save score together with a chosen name

Purpose: Save one's score together with a chosen name.
Created on 28/11/2019

Overview: As a player (primary actor), after winning or losing a game. I want to save my score to the leaderboards after typing my name. After the player types in the name and press save, the game will then store the name together the score in the database. If the name the player entered is not unique on the database, a message will be shown that he/she has to choose another unique name and type it in again.

According to requirements:

- The player shall be able to enter the name they want to save together with the just recorded score, after a play has ended.
- The game shall store scores in a database, together with the name entered by the user.

Actors:

- Player

Pre-conditions:

- The game should be connected to the database.
- The player should be logged in.
- The player should just win/lose a game.

Post-conditions:

- The database contains the score and the username that the player entered.