**CS408: Break! Design Inspection, Code Inspection and Unit Testing**

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# 1. Code Inspection Defects

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| Defect # | Description | Severity | How Corrected |
| 1 | The program does not check whether the email or password is blank when the user clicks login button. | 1 | Added if-else code block to check whether the email and password is empty |
| 2 | The program does not allow user to login if the user has forgotten the username. | 2 | Implemented functionality to recover username. |
| 3 | The password field does not hide the characters. | 2 | Changed the field input type to Password. |
| 4 | The program does not notify the user if they fail to log in. | 2 | Throwing error with appropriate message. |
| 5 | When user pauses the game while the balls are still moving, the balls do not stop. | 1 | Fixed the pause function by changing the ball speeds to 0. |
| 6 | The UI for pause button does not change when the users have to resume the game. | 2 | Updated the pause button UI, adding the resume button after the pause button is pressed. |
| 7 | While the users pause the game in timed mode, the time stops but the game does not stop. | 1 | Made a new pause function for the timed mode. |
| 8 | User cannot choose to play whether normal mode or the timed mode. | 1 | Created UI for different game play mode. |
| 9 | When there are no high scores and the user navigates to the leaderboards page, an error is thrown. | 2 | Added code to only attempt to render the leaderboard when there is at least one score in the database. |
| 10 | When two users have the same score, the order in which they appear on the leaderboard is not the same every time. | 2 | Sorted the leaderboards by score and then by date so that the first player to receive that score is displayed first. |
| 11 | There is not an easy way to tell what the current user’s rank is on the leaderboards. | 2 | If the current user has a score within the top 100 scores, made their usernames appear in bold in the leaderboard. |
| 12 | The current user’s rank is not displayed if their score is not within the top 100 scores. | 2 | Checked whether or not the current user has a score within the top 100 and if they don’t, add another row at the end of the leaderboards table with their rank and score. |

# 2. Design Inspection Defects

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| Defect # | Description | Severity | How Corrected |
| 1 | The ball needs to reflect when it hits the wall, but the ball passes through the wall | 1 | Added an if statement to handle the cases:  1. when ball hits left wall  2. when ball hits right wall  3. when ball hits top wall |
| 2 | The ball starts from the center of the screen even after the first round (should start from where the first ball landed in the previous round) | 1 | Added code to track where the first ball hits the ground, and to start the next round from that exact position. |
| 3 | When the ball (after certain number of reflections) starts moving horizontally, it keeps moving on the same horizontal plane without touching the ground. | 1 | Added small amount of gravity to the game, so that the ball eventually touches the ground. |

# 3. Unit Testing Defects

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| Product | Login unit testing | | |
| Date | 09/17/2018 | | |
| Author | Youshin Kim | | |
| Defect # | Description | Severity | How Corrected |
| 1 | Success when user input nothing and redirects to main page | 1 | Checked the length of the user’s input |
| 2 | Success when user put wrong format of input | 1 | used regex to validate email var re = /^(([^<>()[\]\\.,;:\s@\"]+(\.[^<>()[\]\\.,;:\s@\"]+)\*)|(\".+\"))@((\[[0-9]{1,3}\.[0-9]{1,3}\.[0-9]{1,3}\.[0-9]{1,3}\])|(([a-zA-Z\-0-9]+\.)+[a-zA-Z]{2,}))$/; |
| 3 | No warning information if user enter an invalid username and password | 2 | Used the alert() function to display the error to the user. |

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| Product | Game mode unit test | | |
| Date | 09/21/18 | | |
| Author | Jisoo Cha | | |
| Defect # | Description | Severity | How Corrected |
| 1 | Start the game and choosing the game mode to the timed mode. | 1 | created new UI for the timed game mode. |
| 2 | When playing timed mode, change the status to paused. | 1 | Made and fixed the pause function by reducing the ball speed to 0. |

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| Product | Pause and resume unit test | | |
| Date | 09/21/18 | | |
| Author | Akhil Agrawal | | |
| Defect # | Description | Severity | How Corrected |
| 1 | After starting the game, initiate to shoot the ball consistently. Then change the status to paused to pause the game. | 1 | When status is changed to pause, made the ball stop at the current location and prevent from shooting new balls. |
| 2 | Change the status to playing the game and see if the pause button UI changes. | 2 | When status is playing, then changed to pause, made the pause button UI to resume button. |

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| Product | Leaderboards unit tests | | |
| Date | 09/21/18 | | |
| Author | Alex Geier | | |
| Defect # | Description | Severity | How Corrected |
| 1 | The scores should be ordered from largest to smallest on the leaderboards. | 2 | Sort the scores in descending order before displaying them. |
| 2 | Any players with the same top score should have the same rank on the leaderboards. | 3 | Instead of setting the rank of the player to the index of their score on the leaderboard, use a currentRank variable, and only increment it when the previous score is not the same as the current score so when the previous score and the current score are equal, the ranks will be the same. |
| 3 | Any duplicate scores should be ordered by the date the scores were achieved. | 3 | In addition to sorting the scores by the actual value of the score, sort them by the date as well. |
| 4 | The global leaderboards should refresh every 60 seconds. | 2 | Added a timer that repeatedly counts down from 60 and fetches the newest leaderboard data whenever it reaches 0. |
| 5 | The currently logged in user’s username should appear bolded if he/she has a score on the leaderboards. | 2 | Before the leaderboard is rendered, scan through each score and determine if the user id is the same as the currently logged in user’s id. If they are the same, display that username in bold. |

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| Product | User profile unit tests | | |
| Date | 09/21/18 | | |
| Author | Shivan Desai | | |
| Defect # | Description | Severity | How Corrected |
| 1 | Can’t see the top scores of each game mode | 2 | Currently not fixed, need to make separate sections in the leaderboards table in the backend |
| 2 | Forgot password doesn’t work | 3 | Currently not fixed, need to add a firebase function to send reset password emails to users |
| 3 | Any duplicate scores should be ordered by the date the scores were achieved. | 3 | In addition to sorting the scores by the actual value of the score, sort them by the date as well. |
| 4 | The global leaderboards should refresh every 60 seconds. | 2 | Added a timer to refresh every minute |