Comprehensive Exercise Report

Team OMARK of Section 123

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# Requirements/Analysis

Week 2

## Journal

The following prompts are meant to aid your thought process as you complete the requirements/analysis portion of this exercise. Please respond to each of the prompts below and feel free to add additional notes.

* After reading the client’s brief (possibly incomplete description), write one sentence that describes the project (expected software) and list the already known requirements.
  + The goal is to create a game software that is as close to the existing Bunco game as possible.
  + From the client, the only available information is about the game rules which will help us deduct the requirements of the game. These requirement will be described within the next bullet points and sections.
* After reading the client’s brief (possibly incomplete description), what questions do you have for the client? Are there any pieces that are unclear? After you have a list of questions, raise your hand and ask the client (your instructor) the questions; make sure to document his/her answers.
  + None, all the requirements can be deducted from the game rules.
* Does the project cover topics you are unfamiliar with? If so, look up the topics and list your references.
  + None
* Describe the users of this software (e.g., small child, high school teacher who is taking attendance).
  + Broad audience:
    - Casual Gamers who enjoy simple and entertaining games without complex rules:
    - Party goers and social gathering enjoyers.
    - All age groups.
    - Limited gaming experience people
* Describe how each user would interact with the software.
  + Casual gamers
    - Casual gamers interact with the software by launching the game and entering a desired username.
    - They select a difficulty level (Easy, Medium, Difficult) based on their preferences.
    - The option to choose a tutorial or skip it caters to users with varying levels of familiarity with the game.
    - Users engage in the main game interface, where they roll dice, accumulate points, and progress through rounds.
  + Party goers and social gathering enjoyers.
    - Participants at social events open the software and join the game, entering a username.
    - The software sets up the gaming environment, creating tables and assigning random names to players.
    - Users take turns rolling dice during each round, fostering a social and interactive atmosphere.
    - As rounds progress, players move between tables, enhancing social interaction and engagement.
  + All age groups.
    - Individuals of all age groups launch the game and input a username.
    - The software accommodates different age preferences by offering various difficulty levels.
    - Children and adults alike engage in the excitement of rolling dice, scoring points, and enjoying the social aspect of the game.
  + Limited gaming experience people
    - Users with limited gaming experience find the software accessible, with clear instructions and a potential tutorial.
    - They follow on-screen prompts to roll dice and accumulate points, with the game's simplicity promoting ease of play.
    - The software's user-friendly interface ensures that even those new to gaming can navigate and enjoy the experience.
* What features must the software have? What should the users be able to do?
  + - User Registration
    - Difficulty Selection
    - Game Rule Visualization
    - Game Initialization
    - Round Display
    - Dice Rolling
    - Score Tracking
    - Round Progression
    - Scoring Rules
    - Scoring Display(Table)
    - Game Termination
    - Result Calculation
    - User-Friendly Interface
    - Option to Quit or Restart

## Software Requirements

***Functional Requirements:***

1. **User Registration:**
   * Users should be able to enter a username to participate in the game.
2. **Difficulty Selection:**
   * Users should be able to choose the game difficulty (Easy, Medium, Hard), affecting your scoring probabilities
3. **Game Rule Visualization:**
   * Users can access a extra view to read the game rules during the game experience.
4. **Game Initialization:**
   * Based on the selected difficulty, the system should create the specified number of tables with randomly assigned names for each player.
5. **Round Display:**
   * The system should display and announce the current round number (1 to 6).
6. **Dice Rolling:**
   * Players should be prompted to roll the dice during each round.
7. **Score Tracking:**
   * The system should keep track of the points earned by each player and display them in a table.
8. **Round Progression:**
   * The game should progress to the next round when the first table reaches 21 points.
9. **Scoring Rules:**
   * Points should be awarded based on the rules, including one point for each dice matching the round number, five points for three of a kind with no matching round number, and 21 points for three of a kind matching the round number.

***Non-Functional Requirements:***

1. **Usability:**
   * The user interface should be intuitive and easy to navigate.
2. **Performance:**
   * The system should respond promptly to user actions, especially during dice rolls.
3. **Reliability:**
   * The game should reliably progress through rounds and accurately track scores.
4. **Security:**
   * Protect against potential exploits or cheating.

***Constraints:***

1. **Platform Compatibility:**
   * The game should be developed for a specific operating system or be platform-independent.
2. **Programming Language:**
   * Specify the programming language to be used for system development.
3. **Responsive Design**
   * The game must be playable on both PC and mobile devices while maintaining a fitting resolution at all times.

***End-of-Game Requirements:***

1. **Result Calculation:**
   * Calculate and display the best table and best player based on the highest scores after six rounds.
2. **Game Termination:**
   * End the game after six rounds and declare the winner.

# Black-Box Testing

Instructions: Week 4

## Journal

***Remember:*** Black box tests should only be based on your requirements and should work independent of design.

The following prompts are meant to aid your thought process as you complete the black box testing portion of this exercise. Please review your list of requirements and respond to each of the prompts below. Feel free to add additional notes.

* What does input for the software look like (e.g., what type of data, how many pieces of data)?
  + Username: A string representing the user's chosen username.
  + Difficulty Level: An integer or string indicating the selected difficulty level (Easy, Medium, Hard).
  + Game Initialization: No direct user input; system-generated tables with random player names.
  + Dice Rolling: User-triggered action; no specific input required.
  + Round Progression: Triggered by system based on points reaching 21; no direct user input.
* What does output for the software look like (e.g., what type of data, how many pieces of data)?
  + Round Display: An integer indicating the current round number (1 to 6).
  + Score Tracking: Tables displaying points for each player and the cumulative points earned.
  + Result Calculation: Displaying the best table and best player based on the highest scores.
* What equivalence classes can the input be broken into?
  + Username:
    - Valid usernames (alphanumeric characters, special characters, length constraints).
    - Invalid usernames (empty, excessively long).
  + Difficulty Level:
    - Valid difficulty levels (Easy, Medium, Hard).
* What boundary values exist for the input?
  + Username Length: Test for minimum and maximum length.
  + Difficulty Level: Test for minimum and maximum values.
  + Dice Rolling: Simulate dice rolls with minimum and maximum values.
* Are there other cases that must be tested to test all requirements?
  + Game Termination: Testing the end of the game after six rounds.
  + Round Termination: Test round end.
* Other notes:
  + Test the system's response to unexpected or erroneous user inputs.

## Black-box Test Cases

|  |  |  |  |
| --- | --- | --- | --- |
| Test ID | Description | Expected Results | Actual Results |
| 1 | Valid Username | User enters a valid alphanumeric username. |  |
| 2 | Invalid Username (Empty) | User leaves the username field empty. |  |
| 3 | Invalid Difficulty Level | User leaves empty difficulty choice. |  |
| 4 | Valid Difficulty Level | User selects a valid difficulty level (Easy, Medium, Difficult). |  |
| 5 | Username Length (Minimum) | User enters a username with the minimum length. |  |
| 6 | Username Length (Maximum) | User enters a username with the maximum length. |  |
| 7 | Dice Rolling (Simulation) | Simulate dice rolls with minimum and maximum values. |  |
| 8 | Game Termination (End of 6 Rounds) | Test the end of the game after completing six rounds. |  |
| 10 | Multi-Player Interaction | Simulate simultaneous actions from multiple users. (Simulate AI) |  |
| 11 | Round Termination (End of Round X) | Test the end of the actual round |  |

# Design

Instructions: Week 6

## Journal

***Remember:*** You still will not be writing code at this point in the process.

The following prompts are meant to aid your thought process as you complete the design portion of this exercise. Please respond to each of the prompts below and feel free to add additional notes.

* List the nouns from your requirements/analysis documentation.
  + GameSettings(difficulty)
  + Tutorial
  + Game
  + Round
  + Dice
  + Scoreboard
  + Scoring
  + UI
  + Security
  + GameResult
* Which nouns potentially may represent a class in your design?
  + GameSettings
  + Tutorial
  + Game
  + Round
  + Dice
  + Scoreboard
  + Scoring
  + UI
  + Security
  + GameResult
* Which nouns potentially may represent attributes/fields in your design? Also list the class each attribute/field would be a part of.
  + GameSettings
    - difficultyLevel (GameSettings)
  + Round
    - roundNumber (Round)
  + Scoreboard
    - scores (Scoreboard)
    - bestTable (Scoreboard)
    - bestPlayer (Scoreboard)
  + Dice
    - value (Dice)
  + Scoring
    - roundScore (Scoring)
    - totalScore (Scoring)
  + UI
    - displayMessage (UI)
  + Security
    - validatedInput (Security)
  + GameResult
    - winner (GameResult)
    - endStatus (GameResult)
* Now that you have a list of possible classes, consider different design options (***lists of classes and attributes***) along with the pros and cons of each. We often do not come up with the best design on our first attempt. Also consider whether any needed classes are missing. These two design options should not be GUI vs. non-GUI; instead you need to include the classes and attributes for each design. Reminder: Each design must include at least two classes that define object types.
  + Design Option 1: Monolithic Design
    - Classes and Attributes:
      * User (username)
      * GameSettings (difficultyLevel)
      * Tutorial
      * Game
      * Round (roundNumber, currentPlayers)
      * Dice (value)
      * Scoreboard (scores, bestTable, bestPlayer)
      * Scoring (roundScore, totalScore)
      * UI (displayMessage)
      * Security (validatedInput)
      * GameResult (winner, endStatus)
    - Pros:
      * Simple and straightforward
      * All functionalities in one place
    - Cons:
      * Less modular
      * Difficult to maintain and scale
  + Design Option 2: Modular Design
    - Classes and Attributes:
      * Settings (difficultyLevel)
        + GameSettings
        + Tutorial
      * Game
        + User (userName)
        + Round (roundNumber, currentPlayers)
        + Dice (value)
        + Scoreboard (scores, bestTable, bestPlayer)
        + Scoring (roundScore, totalScore)
      * UI (displayMessage)
        + Security (validatedInput)
        + GameResult (winner, endStatus)
    - Pros:
      * Modular and easier to maintain
      * Encapsulation of functionalities
    - Cons:
      * More classes may lead to complexity
      * Inter-class communication might be needed
* Which design do you plan to use? Explain why you have chosen this design.

We plan to use Modular Design (Design Option 2) because it offers better modularity, easier maintenance, and encapsulation of functionalities. This design allows for scalability and makes it easier to manage each component of the game separately, leading to a more organized and maintainable codebase.

* List the verbs from your requirements/analysis documentation.
  + enter, choose, indicate, create, display, announce, prompt, keep, progress, award, match, navigate, respond, track, protect, calculate, terminate, declare
* Which verbs potentially may represent a method in your design? Also list the class each method would be part of.
  + After taking those exact verbs and adding the context of the requirement to them we end up with:
  + Settings: setDifficulty(), displayTutorial()
  + Game: initializeGame(), setPlayerUserName(), displayRound(), nextRound(), rollDice(), calculateRoundScore(), calculateTotalScore(), endGame(), calculateWinner(),
  + Scoreboard: updateScoreBoard(), caculateBestTable(), calculateBestPlayer()

## Software Design

Note: It is to notice that some classes and attributes have been changed and updated after more thinking and software designing. As well as some Wireframing and design changes helped us decide for the following software design and architecture:

Ein Bild, das Screenshot, Text, Diagramm, Reihe enthält.

Automatisch generierte Beschreibung

# Implementation

Instructions: Week 8

## Journal

The following prompts are meant to aid your thought process as you complete the implementation portion of this exercise. Please respond to each of the prompt below and feel free to add additional notes.

What programming concepts from the course will you need to implement your design? Briefly explain how each will be used during implementation:

* State Management: To keep track of the game's state, including player scores, current round, dice rolls, and game progress.
* Event Handling: For capturing user interactions such as rolling dice, starting a new game, or navigating through the game's interface.
* Modularization: Breaking down the application into smaller, reusable components for better code organization and maintainability.
* Version Control (Git): Tracking changes, collaborating with other developers, and managing different versions of the application.
* Testing: Ensuring the correctness and reliability of the application through unit tests, integration tests, and automated testing.
* Documentation: Providing clarity and guidance to developers and users through comments, README files, and user guides.

Other notes:

* Code Reviews: Conducting peer code reviews to identify potential issues, share knowledge, and improve code quality.
* Agile Development: Adopting agile methodologies for managing project scope, prioritizing tasks, and delivering incremental value.
* User Experience (UX) Design: Considering the overall user experience and interface design of the game to ensure it is intuitive and engaging for players.

## Implementation Details

<<Use your notes from above to write code and complete this section of the formal documentation with a README for the user that explains how he/she will interact with the system.>>

**Simplified Bunco**

Welcome to the Bunco Game System! This system allows users to play a simplified version of the Bunco dice game. Follow the instructions below to interact with the system.

**Getting Started**

To use the Bunco Game System, you'll need to have Node.js and npm (Node Package Manager) installed on your machine. If you haven't installed them yet, you can download and install them from [nodejs.org](https://nodejs.org/).

**Installation**

1. Clone this repository to your local machine:

bash

Copy code

git clone <repository-url>

1. Navigate to the project directory:

bash

Copy code

cd bunco-game-system

1. Install project dependencies:

bash

Copy code

npm install

**Running the Application**

To run the Bunco Game System, follow these steps:

Web-Application:

1. Open <https://simplified-bunco.netlify.app/> in the web browser.

Alternative NPM:

1. Start the application:

bash

Copy code

npm start

1. The application will open in your default web browser. If not, navigate to http://localhost:3000 in your web browser.

**Interacting with the System**

**New Game**

1. Click on the "New Game" button on the header to start a new game.
2. Enter your username and select a difficulty level (Easy, Medium, or Hard) in the modal window that appears.
3. Click "Start Game" to begin playing.

**Game Rules**

1. Click on the "Game Rules" button on the header to view the rules of the game.
2. Read through the game rules and close the modal window by clicking "Close".

**Gameplay**

1. Once the game starts, you will see the dice roll area and game board components.
2. Click the "Roll Dice" button in the dice roll area to roll the dice.
3. Try to match the target number for each round and score points according to the game rules.
4. The game consists of multiple rounds, and the winner(s) will be displayed at the end of the game.

**Final Results**

1. After completing all rounds, the final results modal will appear automatically.
2. The winners of the game (both players and tables) will be displayed in the final results modal.

**Additional Information**

* The footer contains a disclaimer about the experimental nature of this game.

# Testing

Instructions: Week 10

## Journal

The following prompts are meant to aid your thought process as you complete the testing portion of this exercise. Please respond to each of the prompts below and feel free to add additional notes.

* Have you changed any requirements since you completed the black box test plan? If so, list changes below and update your black-box test plan appropriately.
  + We changed a tutorial option towards a modal showing the game rules for simplicity
* List the classes of your implementation. For each class, list equivalence classes, boundary values, and paths through code that you should test.
  + **1. App**
  + **Equivalence Classes:**
    - Username validity: valid alphanumeric, empty, minimum length, maximum length.
    - Difficulty level: valid (Easy, Medium, Difficult), invalid (empty).
    - Game state transitions: game not started, game started, game rules modal open, final results modal open.
  + **Boundary Values:**
    - Username: minimum length (1 character), maximum length (e.g., 20 characters).
    - Difficulty level: selection states (none, Easy, Medium, Difficult).
  + **Paths through Code:**
    - Starting a new game with a valid username and difficulty.
    - Attempting to start a game with an invalid username or no difficulty.
    - Opening and closing the game rules modal.
    - Ending the game after six rounds.
  + **Tests:**
    - Valid Username
    - Invalid Username (Empty)
    - Valid Difficulty Level
    - Invalid Difficulty Level (Empty)
    - Username Length (Minimum)
    - Username Length (Maximum)
    - Game Termination (End of 6 Rounds)
    - Opening and closing Game Rules Modal
  + **2. CreateNewname (Modal Component)**
  + **Equivalence Classes:**
    - Modal open states: modal open, modal closed.
    - Username validity and length.
    - Difficulty level selection.
  + **Boundary Values:**
    - Username: minimum and maximum length.
    - Difficulty selection: no selection, valid selection.
  + **Paths through Code:**
    - Opening the modal and inputting a valid username and difficulty.
    - Attempting to start a game with an empty username or difficulty.
    - Closing the modal without starting a game.
  + **Tests:**
    - Valid Username
    - Invalid Username (Empty)
    - Valid Difficulty Level
    - Invalid Difficulty Level (Empty)
    - Username Length (Minimum)
    - Username Length (Maximum)
  + **3. GameRulesModal (Modal Component)**
  + **Equivalence Classes:**
    - Modal open states: modal open, modal closed.
  + **Boundary Values:**
    - None specific, as the modal content is static.
  + **Paths through Code:**
    - Opening and closing the game rules modal.
  + **Tests:**
    - Opening and closing Game Rules Modal
  + **4. DiceRollArea**
  + **Equivalence Classes:**
    - Dice roll results: minimum value (1), maximum value (6).
    - Updating scores and rounds.
  + **Boundary Values:**
    - Dice values: 1, 6 (assuming a standard 6-sided die).
    - Round numbers: 1 to 6.
  + **Paths through Code:**
    - Simulating a dice roll and updating the score.
    - Advancing the round after dice rolls.
  + **Tests:**
    - Dice Rolling (Simulation)
    - Round Termination (End of Round X)
  + **5. GameBoard**
  + **Equivalence Classes:**
    - Player scores and round states.
    - Updating final winner player and table.
  + **Boundary Values:**
    - Scores: minimum score (0), maximum score (depending on game rules).
    - Rounds: 1 to 6.
  + **Paths through Code:**
    - Displaying the current round and scores.
    - Determining the final winner after the last round.
    - Handling simultaneous actions (AI player interactions).
  + **Tests:**
    - Multi-Player Interaction
    - Round Termination (End of Round X)
  + **6. FinalScoreTable**
  + **Equivalence Classes:**
    - Displaying final results.
    - Modal open states: modal open, modal closed.
  + **Boundary Values:**
    - Final scores: minimum score (0), maximum score.
  + **Paths through Code:**
    - Displaying final scores when the game ends.
    - Opening and closing the final results modal.
  + **Tests:**
    - Game Termination (End of 6 Rounds)
    - Displaying final results in modal
* Other notes:
  + **Summary of Tests**
    - Valid Username
    - Invalid Username (Empty)
    - Valid Difficulty Level
    - Invalid Difficulty Level (Empty)
    - Username Length (Minimum)
    - Username Length (Maximum)
    - Dice Rolling (Simulation)
    - Game Termination (End of 6 Rounds)
    - Multi-Player Interaction
    - Round Termination (End of Round X)
    - Opening and closing Game Rules Modal

## 

## 

## Testing Details

|  |  |  |  |
| --- | --- | --- | --- |
| Test ID | Description | Expected Results | Actual Results |
| 1 | Valid Username | User enters a valid alphanumeric username. | Ein Bild, das Schrift, Grafiken, Screenshot, Text enthält.  Automatisch generierte Beschreibung |
| 2 | Invalid Username (Empty) | User leaves the username field empty. | Ein Bild, das Screenshot, Text, Schrift enthält.  Automatisch generierte Beschreibung |
| 3 | Invalid Difficulty Level | User leaves empty difficulty choice. | Ein Bild, das Screenshot, Text, Schrift enthält.  Automatisch generierte Beschreibung |
| 4 | Valid Difficulty Level | User selects a valid difficulty level (Easy, Medium, Difficult). | Ein Bild, das Schrift, Text, Grafiken, Logo enthält.  Automatisch generierte Beschreibung |
| 5 | Username Length (Minimum) | User enters a username with the minimum length. | Ein Bild, das Text, Screenshot, Schrift enthält.  Automatisch generierte Beschreibung |
| 6 | Username Length (Maximum) | User enters a username with the maximum length. | Ein Bild, das Text, Screenshot, Schrift enthält.  Automatisch generierte Beschreibung |
| 7 | Dice Rolling (Simulation) | Simulate dice rolls with minimum and maximum values. | Ein Bild, das Würfel enthält.  Automatisch generierte Beschreibung mit mittlerer Zuverlässigkeit |
| 8 | Game Termination (End of 6 Rounds) | Test the end of the game after completing six rounds. | Ein Bild, das Text, Screenshot, Schrift, Logo enthält.  Automatisch generierte Beschreibung |
| 10 | Multi-Player Interaction | Simulate simultaneous actions from multiple users. (Simulate AI) | Ein Bild, das Text, Screenshot, Schrift, Zahl enthält.  Automatisch generierte Beschreibung |
| 11 | Round Termination (End of Round X) | Test the end of the actual round | Ein Bild, das Text, Screenshot, Schrift, Betriebssystem enthält.  Automatisch generierte Beschreibung |

# Presentation

Instructions:Week 12

## Preparation

**Project Description**

**Brief Description of the Final Project:**

* **A simplified Bunco game**: The project aims to develop a user-friendly digital version of the Bunco game, designed to provide an enjoyable and smooth playing experience for a diverse audience. The game includes features like user registration, difficulty selection, round display, dice rolling, and score tracking.

**Requirement Assumptions/Additions:**

* Assumed that the game will be played by a single player against AI opponents.
* The user interface must be responsive and intuitive, supporting various devices and screen sizes.
* Difficulty levels will affect the AI's behavior, making it easier or harder to beat.
* The game must handle typical user actions such as starting a new game, rolling dice, and viewing game rules smoothly.
* The final game results will be displayed at the end of the sixth round.
* Security measures to validate user inputs (e.g., username and difficulty selection) are implemented.

**Design Options and Decisions:**

* **Modular Design vs. Monolithic Design**:
  + **Modular Design**: Chosen to enhance maintainability, scalability, and separation of concerns. Each game component (e.g., dice rolling, score tracking) is encapsulated in its module.
  + **Monolithic Design**: Considered for its simplicity and straightforward implementation, but was not chosen due to potential difficulties in maintaining and scaling the application.

**Pros and Cons Weighed**:

* **Modular Design**:
  + Pros: Easier maintenance, improved scalability, better code organization.
  + Cons: Increased initial complexity, more inter-module communication.
* **Monolithic Design**:
  + Pros: Simpler initial implementation, all-in-one approach.
  + Cons: Harder to maintain and scale, less flexible.

**Effect of Extension on Design:**

* Extensions such as AI player simulation and difficulty level adjustments required additional modules and more complex inter-module communication.
* The need for responsive design influenced the UI component's flexibility and adaptability to different screen sizes and devices.
* The requirement to display final game results led to the creation of a separate results modal and score tracking enhancements.

**Tests (Equivalence Classes, Boundary Values, and Paths):**

* **Equivalence Classes**: Valid and invalid username entries, valid and invalid difficulty selections, dice roll values (1-6), round completions, and game terminations.
* **Boundary Values**: Minimum and maximum lengths for usernames, minimum and maximum dice roll values.
* **Paths**: Starting the game, rolling dice, updating scores, progressing through rounds, ending the game, and displaying results.

**Lessons Learned:**

* **Programming Concepts**: Understanding modular design, state management in React, and component-based architecture.
* **Software Process**: Importance of detailed planning and documentation, continuous code review, and version control. Realized the significance of user feedback and iterative improvements.
* **Challenges**: Handling inter-module communication and ensuring the UI remained responsive and user-friendly across different devices.

**Functionalities to Demo:**

* User registration and difficulty selection.
* Starting a new game.
* Rolling dice and updating scores.
* Round progression and completion.
* Viewing game rules.
* Displaying final results after six rounds.

**Presentation Plan:**

* Magnus:
  + Introduction & Agenda
  + About the project
  + First Analysis &Software Requirements
  + Design
  + Software Design
* Omar:
  + Design Choice
  + Demonstration
    - Game Start
    - Final Scores
  + Testing
  + Lessons Learned