Department of Computer Engineering

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CS 319 Project

Chess Battle

Analysis Report

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1.   Introduction

Chess Battle is a strategy game with enhanced gameplay inspired by the regular chess game. Pieces will move similar to real chess moves, however, they have modified attacks and health points, attack range and special skills with cooldowns.

2.   Proposed System

2.1.   Overview

Chess Battle is a strategy game where the player needs to consider more complex terms like health points (hp), attack points (ap), range or the remaining cooldown on a special skill to defeat the opponent. Every piece differs from the other piece type according to its attributes. A more important piece like the king will have more Health Points (HP), Attack Points (AP) and more powerful skill than the other pieces. However some pieces are specialized for some roles such as rook, bishop and knight. To be able to finish the game one player needs to either destroy all the pieces or assassinate the opponent's king first, depending on the game mode selected.

2.2.   Functional Requirements

2.2.1. Display Start Menu

The game should display a Start Menu when launched. Using the Start Menu the player has the option to either start a new game or view help. If the user

decides to start a new game he will have to pick from two separate game modes, "Assassination" or "Elimination".

2.2.2. Create Board and Pieces

When a game mode is selected and the game is started, the game board should be created with every piece is placed in their starter positions. The game needs to be shown and be ready for the players. Moreover a status sidebar should be ready to be shown to the players which is able to display the information of selected chess piece and its Move/Attack commands.

2.2.3. Play Game

After the board and game pieces are initialized, gameplay can begin. There will be 2 human players, the White player and the Black player, with the White one starting. The player will use the mouse to click on the pieces. After clicking on a Piece, a sidebar on the right should display information about that piece's AP and HP, and should show possible actions as buttons (Attack/Move or Use Special Ability). If the player clicks Attack/Move, the allowed moves should be highlighted on the board, after which the player can choose one of them by clicking on the highlighted area. A player's turn ends after he performs one move or uses a special ability. The game end condition will depend on the game mode chosen. Background Music will also be played during gameplay.

2.2.4. Display End of Game Screen

When the game ends according to selected game mode rule, a screen needs to be shown to the players which includes the information about the game mode and the winning player. The screen should be able to offer the players two choices which are restarting the game with the recently selected game mode or return to main menu.

2.2.5. View Help

The help screen will display helpful information about the game rules and pieces. This includes information about valid moves for each piece, attack and health points of piece types and explanations regarding the special abilities of some pieces.

2.3. Non-functional Requirements

2.3.1. Game Modes

Game modes should offer player to select between two game modes: elimination and assassination. For the elimination mode each player aims to kill every individual piece of the other team. When one of the players lost every one of his/her 16 pieces, the other player is the winner of the game. For the assassination game mode, the purpose of the players is to kill the opponent's king first. The first player who is able to kill the king is the victorious.

2.3.2. Health Points, Attack Points, and Attacking Mechanism

Each piece has Health Points (HP) and Attack Points (AP). A piece dies when its HP reaches zero or less. A piece does equal damage to its AP when it attacks. A player can perform only one move/attack per turn.

2.3.3. General Movement

Every individual piece in the game should share three general movement rules. Pieces shouldn't be able to move out of the board coordinates, no two pieces can occupy the same place, and a piece cannot move to its own coordinates. If any of these rules are violated, the move will be considered invalid and cancelled so that the player would make another valid move.

2.3.4. Pieces

King

As in normal Chess, the King is the most important piece in the game which the player should protect and use efficiently

Health Points: 500 HP

Attack Points: 100 AP

Movement: The King will follow standard King movement in chess, that is, it will move in a square around its current position

Attacking: The King will have a melee attack, it will attack any enemy piece in the same range as its movement.

Special Ability: "Inspire" (Passive) - The King inspires the neighbor friendly pieces which are in the move range of the King. The inspired pieces will have +10 attack points.

Queen

The Queen is the second most important piece in the game, after the King. The Queen is the most advanced fighter in the battlefield and has the strongest impact in the gameplay.

Health Points: 200 HP

Attack Points: 50 AP

Movement: The Queen can move diagonally, vertically or horizontally from its current position.

Attacking: The Queen will have a range attack, which means it can attack any piece which is in Queen's line of movement without changing its position. Therefore, the Queen can attack any enemy piece that is on a diagonal, vertical, or horizontal line from it as long as no other piece is in its way.

Special Ability: "Barrage" (Active, 6 Turn Cooldown) - The Queen can Barrage an area that it can attack. When a square is barraged, that square and every square neighbouring it receives 20 damage if it is occupied by an enemy.

Rook

The rook is specialized in defensive abilities which can reduce incoming damage and protect its team.

Health Points: 100 HP

Attack Points: 20 AP

Movement: The Rook will move vertically and horizontally from its current position.

Attacking: The Rook will have a range attack similar to that of Queen, it will attack any enemy piece in the same range as its movement.

Special Ability: "Fortify" (Active, 6 Turns Cooldown) - The Rook fortifies itself for 1 future attack and reduces the incoming attack by %75. This effect can stack if the Rook have unused charges on it.

Knight

The Knight will be a fighter piece in the game, therefore, it has a slightly higher HP than Bishop and Rook and has higher AP as well.

Health Points: 125 HP

Attack Points: 50 AP

Movement: The Knight will move in the same way as it does in regular chess.

Attacking: The Knight will be able to attack to the squares it can move to while standing in its position. Thus it is somewhat a ranged attack but with a very short range.

Special Ability: "Whirlwind" (Active, 6 Turns cooldown) - The Knight deals 25 damage to enemies in a square around him.

Bishop

The Bishop will be another range attacking Piece. It will also have a healing role, which will be reflected in its special ability.

Health Points: 100 HP

Attack Points: 20 AP

Movement: The Bishop will move diagonally from its current position.

Attacking: The Bishop has a diagonal range attack.

Special Ability: "Prayer" (Active, 10 Turns cooldown) - The Bishop heals friendly pieces in a square around him by 20 HP. A piece's HP cannot increase past its initial HP

Pawn

The pawns are the like soldiers in the game, they are numerous in number and therefore have low HP and AP

Health Points: 50 HP

Attack Points: 20 AP

Movement: The Pawns will only move forward one tile from their current position

Attacking: The pawn will have a melee attack, it can attack an enemy piece that is forward one piece diagonally either to the left or to the right.

Special Ability: "Accolade" (Passive) - If a pawn manages to pass to the end tile of enemy side it gets promoted to a Knight. The new Knight will have the initial conditions of a Knight.

Piece Stat Analysis

The Pieces are designed in such a way that they have values relative to that of the King, where the value of the King is 100. For Example, the Queen has a value that is little than half that of the King, therefore its AP + HP adds up to a value that is close to 40% of that of the King. Melee Pieces are also given

higher HP and AP since they will be more susceptible to danger as they have to get close to enemy pieces. These stats are described in Table 1 below.

	King	Queen	Bishop	Rook	Knight	Pawn
HP	500	200	100	100	125	50
AP	100	50	20	20	50	20
Type	Melee	Range	Range	Range	Limited Range	Melee
Value	100	40	20	20	25	10

Table 1: Piece Stats

Disclaimer: The values of HP, AP, Cooldowns, etc are subject to change during implementation if we see that they would cause game unbalance.

2.4.   Pseudo Requirements

- The game will be implemented purely using Java Language
- The game will run on PC using JRE

2.5.   System Model

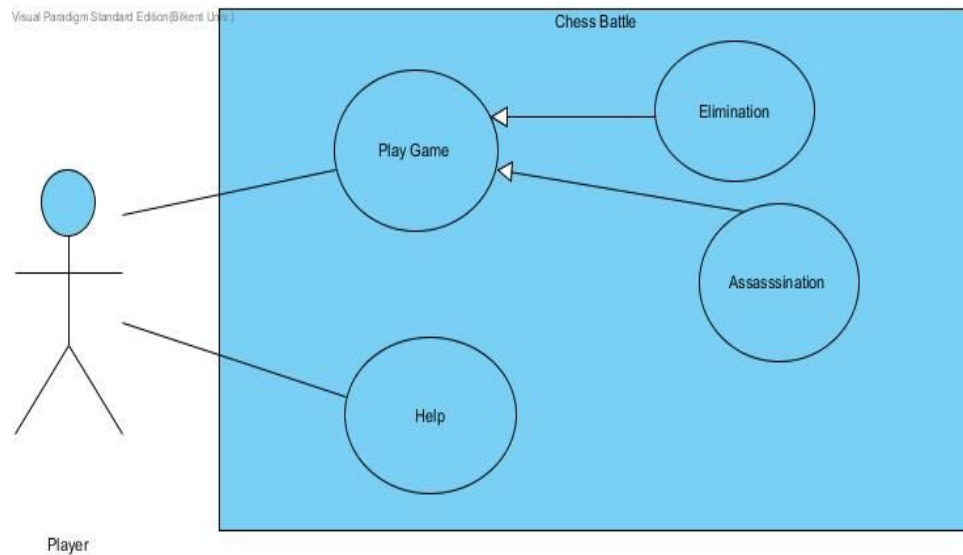### 2.5.1.   Use Case Model

Figure 1: Chess Battle Use Case

Use Case #1

Use case name: Start Elimination Game

Participating actors: Player

Entry condition: User clicks on "Elimination"

Exit condition:

- User exits the game

- User goes back to Main Menu

- One of the users win by eliminating all his enemy's special pieces

Main Flow of Events: A new game in "Elimination" Mode is started

Alternative Flow of Event: Player intentionally exit the game and it causes progres loss.

Use Case #2

Use case name: Start Assassination Game

Participating actors: Player

Entry condition: User clicks on "Assassination"

Exit condition:

- User exits the game

- User goes back to Main Menu

- One of the users win by killing the enemy's king

Main Flow of Events: A new game in "Assassination" Mode is started

Alternative Flow of Event: Player intentionally exit the game and it causes progres loss.

Use Case #3

Use case name: Go to Help Menu

Participating actors: Player

Entry condition: User clicks on "Help"

Exit condition:

- User exits the game

- User goes back to Main Menu

Main Flow of Events: A new window with game instructions is created

Alternative Flow of Event: Player intentionally exit the game and it causes progres loss.
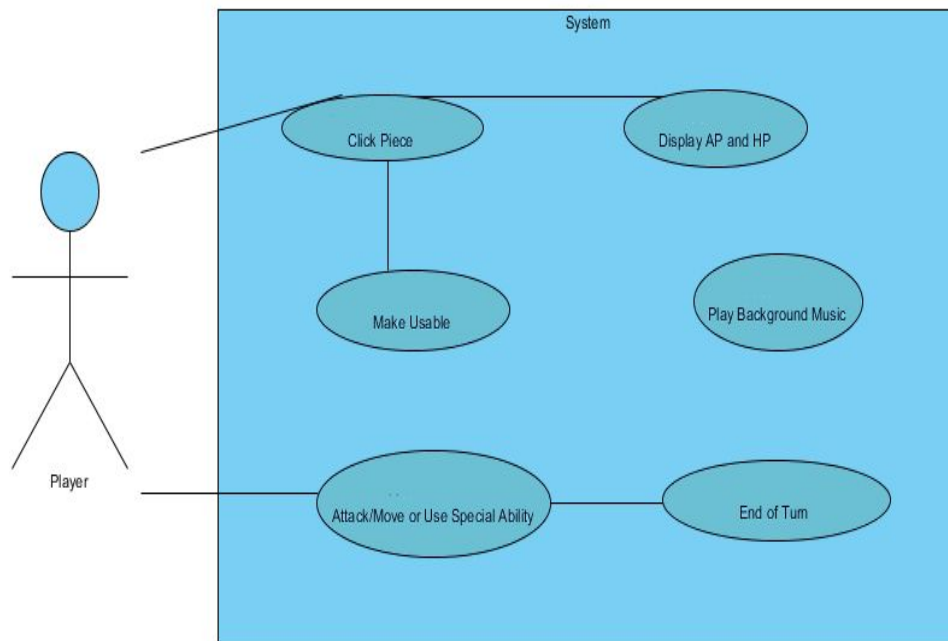

Figure 2: System Use Case

Use Case #4

Use case name: Click Piece

Participating actors: Player

Entry condition: It is the player's turn

 Exit condition:

- User Clicks another Piece
- User goes back to Main Menu

Main Flow of Events: Player clicks piece, AP and HP points are displayed and player is able to attack/move or use special ability.

Use Case #5

Use case name: Attack/Move/Use Special Ability

Participating actors: Player

Entry condition:

- It is the player's turn
- Player Clicked on the intended piece

 Exit condition:

- Turn Ends

- User goes back to Main Menu

Main Flow of Events: Player chooses the option he wants, valid move/attack boxes are highlighted, player chooses the intended box.

2.5.2. Statechart Diagram

This state chart stated in **Figure 3** explains the main loop of the game. At the start of the program initializes the game mode selections which are assasination and elimination mode. After selecting the game mode program starts the game cycle depends game mode. System makes a choice according to user's input which are move your piece (not attack just move your piece), attack enemy piece and use special ability. Moving your piece and using special ability would not end the game that's why it just start the game loop again. But attacking enemy piece have two possibilities which capturing enemy piece or not capturing enemy pieces. If user cannot capture the enemy piece program loop will continue normally and the game will continue with another user turn. If second possibility takes place in other words, user capture enemy's piece, we should re-check the game mode. Because ending of the game depends on mode we choose at the starting of the game. If chosen mode is elimination, we should check whether there is left any enemy pieces or not. If there is left any enemy pieces on the game , the game loop will continue with change the turn of the user. Otherwise , game is end and program shows which side won the game. In assassination mode, we just

check the is king alive or not , if it is alive game loop will continue as other cases. Otherwise, game is ended by program and it show the winner side. Program counts spending time of the game for each match after every game concluded and user will enter game name (specific for this game). Game time will liste up to , if it is necessarily long or short.
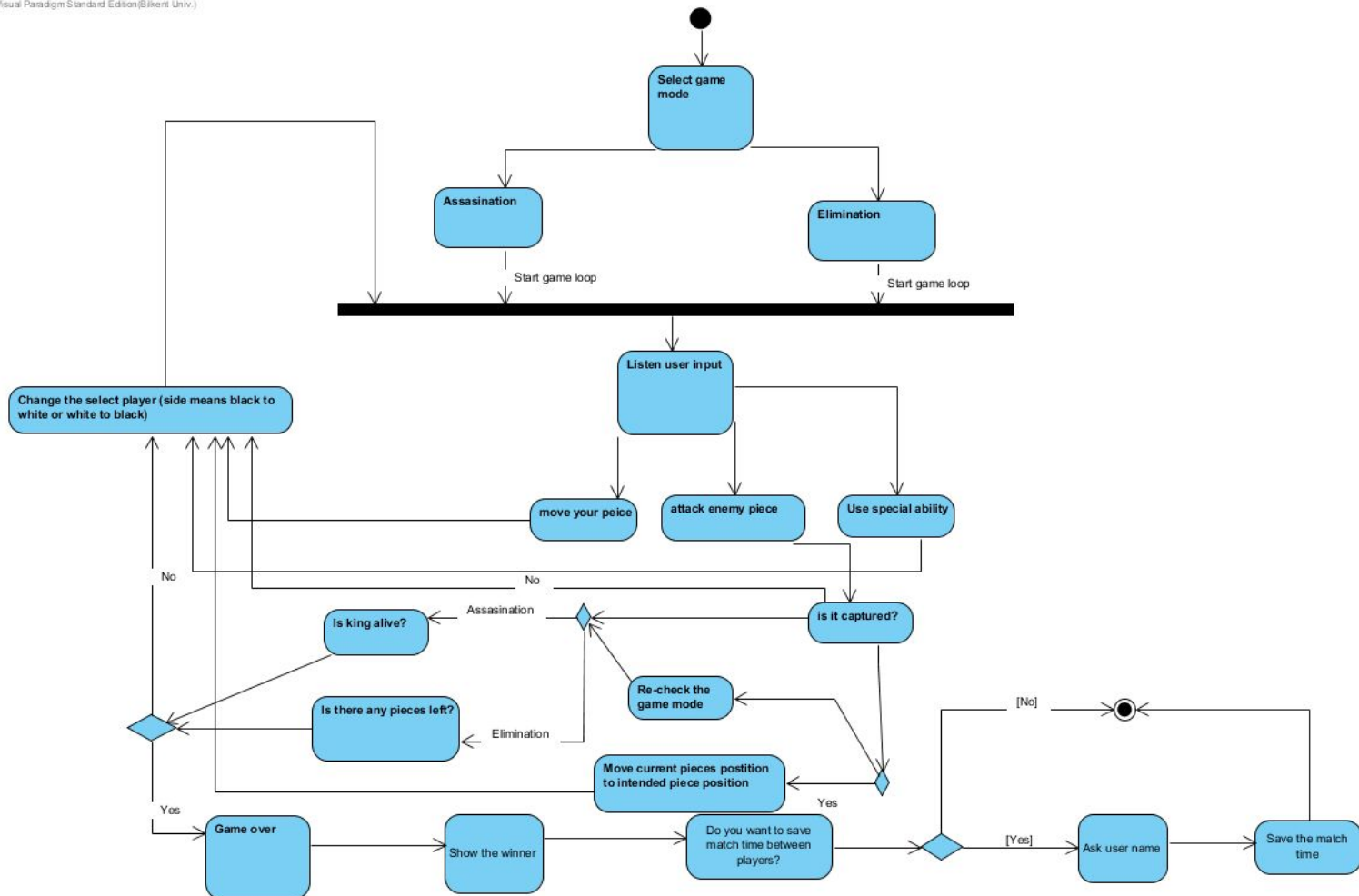
Figure 3: Statechart Diagram

2.5.3. Object and Class Models
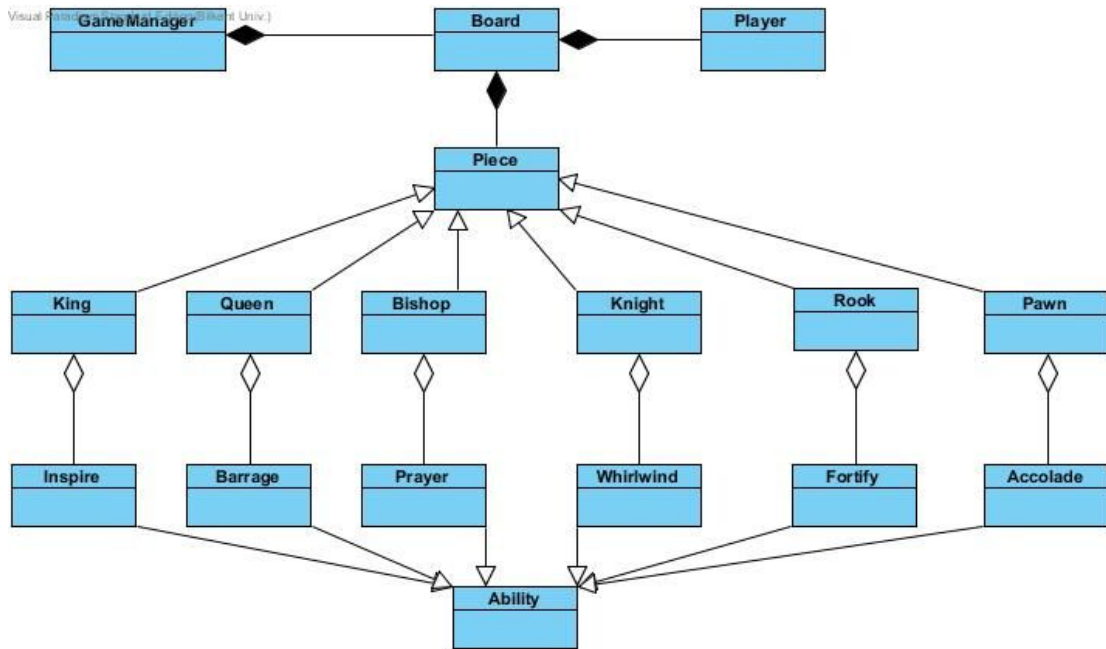
Figure 4: Class Diagram

2.5.4. User Interface - Navigational paths and screen Mock Ups

The menu page stated in figure 5 demonstrates the main functions of the opening page. It includes three buttons which are "Elimination", "Assassination" and "Help". Elimination and Assassination buttons starts a new game according to their unique game modes. Help button displays the rules of the game and the corresponding information of each piece to the players.

Figure 5: Start Menu Screen

In figure 6 it is shown that the initial state of a new game. The sidebar on the right displays the type (Piece), remaining hp (HP), ap (AP) and remaining cooldown (CD) of the selected piece which is highlighted with light orange. The options move, attack, and ability is designated for commanding the selected piece according to player's' strategy decision.
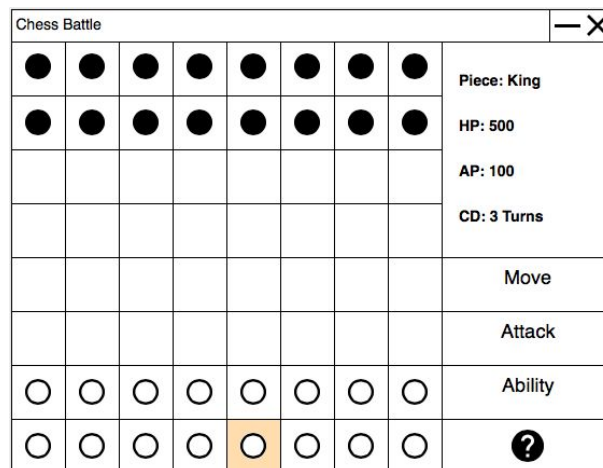

Figure 6: Game Initial State

Figure 7 shows the state when a player selects a piece and clicks the move button. The valid tiles which the piece can move will be highlighted with light green for the user.

Figure 7: Move Highlight (Selected Piece: Queen)

Similarly, figure 8 shows the same scenario for attack move. The valid tiles which are in the attack range of selected piece and have an enemy piece on it, will be highlighted with light red.

Figure 8: Attack Highlight (Selected Piece: Queen)