

# Checkers Design Document

2me3

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## 1 Introduction

This document contains the decomposition, uses relationship, traceability, and internal evaluation. Note: Red links and the Uses diagram are clickable hyperlinks (depending on your PDF reader).

## 2 Module Guide

### 2.1 Hardware Hiding Module

#### 2.1.1 Input Module

<b>Type</b>	Hardware Module
<b>Secret</b>	This module translates mouse clicks and keyboard presses to be used by the rest of the software.
<b>Responsibilities</b>	This module will take mouse and keyboard input and convert it to software usable states.
<b>Uses</b>	None
<b>Design</b>	4.5
<b>Code File</b>	Inside Game1.cs, and built into C#.
<b>Explanation</b>	The input module is a hardware hiding module since it translates hardware inputs to software.

### 2.2 Behaviour Hiding Module

#### 2.2.1 Piece Module

<b>Type</b>	Software Module
<b>Secret</b>	This module hides and separates specific piece information.
<b>Responsibilities</b>	This will hold the necessary components to describe what a game piece will contain, which will be separate from the game board.
<b>Uses</b>	None
<b>Design</b>	4.1
<b>Code File</b>	Piece.cs
<b>Explanation</b>	The piece is a part of behaviour hiding since the piece module holds specific piece information and outputs values needed by other modules.

### 2.3 Software Decision Hiding Module

#### 2.3.1 Game1 Module

<b>Type</b>	Software Module
<b>Secret</b>	This module hides how the graphics are displayed and how we switch between states of the game.
<b>Responsibilities</b>	This module will be the responsible for the initial execution of the game, this class connects and launches critical components together.
<b>Uses</b>	2.3.2, 2.2.1, 2.1.1
<b>Design</b>	4.3
<b>Code File</b>	Game1.cs
<b>Explanation</b>	The module is a part of software decision hiding since it determines how we draw the graphics and what to do when we switch between states of the game.

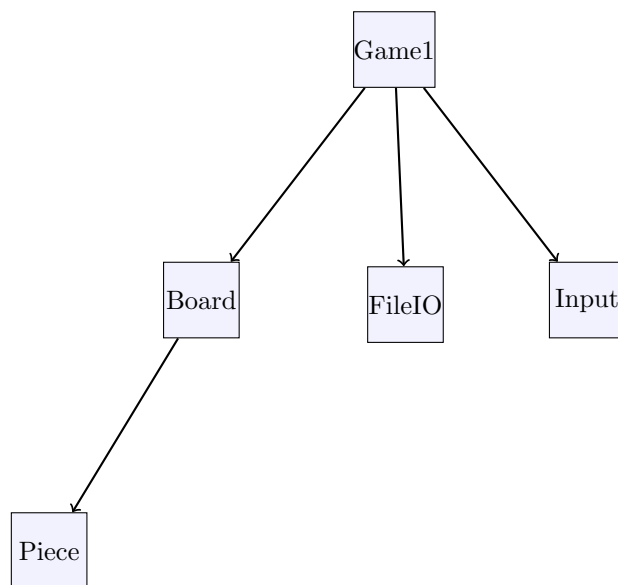
### 2.3.2 Board Module

<b>Type</b>	Software Module
<b>Secret</b>	This module serves to hide the secret of how the board is defined internally.
<b>Responsibilities</b>	This module is responsible for holding the necessary components and attributes to setup the board and describe piece locations.
<b>Uses</b>	2.2.1
<b>Design</b>	4.2
<b>Code File</b>	Board.cs
<b>Explanation</b>	The board is a part of software decision hiding since the board implements a data structure that holds the placement of the pieces, this data structure might be changed for increased performance. Another software decision is deciding how to take user input to parse the placement of pieces.

### 2.3.3 FileIO Module

<b>Type</b>	Software Module
<b>Secret</b>	This module allows the user to save the current game session as a plain text file and also load previous games by parsing the plain text file into a representation of the board.
<b>Responsibilities</b>	This module is responsible for the load and saving of the current game
<b>Uses</b>	none
<b>Design</b>	4.4
<b>Code File</b>	FileIO.cs
<b>Explanation</b>	The module is a part of software decision hiding since it determines how the game will be saved and represented in a text file, and also how the file is parsed to reload a saved game file.

## 3 Uses Relationship



## 4 Module Design (MIS and MID)

### 4.1 Piece Module

#### 4.1.1 Interface

<b>Types</b>	
typeState	enumerate if the piece is normal or king
player	enumerate if piece owned by Black or White
<b>Constants</b>	
None	
<b>Access Programs</b>	
getType() : typeState	Retrieves the piece's current type.
setType(newType : typeState)	Changes the piece's type.
getOwner() : player	Says who owns the piece.

#### 4.1.2 Implementation

<b>Variables</b>	
pieceType : typeState	holds current piece type
owner : player	holds information of the piece's owner
<b>Access Programs</b>	
<b>getType() : typeState</b>	
Inputs	None
Updates	None
Outputs	pieceType
Description	Returns the current type of the piece.
<b>setType(newType : typeState)</b>	
Inputs	newType
Updates	None
Outputs	pieceType
Description	Changes the type of piece to the type given.
<b>getOwner() : player</b>	
Inputs	None
Updates	None
Outputs	owner
Description	Returns which player the piece is owned by.

## 4.2 Board Module

### 4.2.1 Interface

#### Types

None

#### Constants

None

#### Access Programs

setUpBoard()	Sets up board based on user input.
getPiece(col : int, row : int) : Piece	This method is used to determine if a piece exists on a square of the board. If the piece does exist, we pass it along to the caller.
placePiece(col : int, row : int, piece : Piece)	Places the piece on the board while checking if the placement is legal (in terms of checkers).
movePiece(fromCol : int, fromRow : int, toCol : int, toRow : int)	Moves the piece from starting to end positions while checking if the movement is valid (in terms of checkers).
clear()	Removes all pieces from the board.

## 4.2.2 Implementation

### Types

None

### Constants

None

### Variables

pieceArray : array	Contains all the Piece objects currently on the board in an array.
numWhitePieces : int	Holds the number of white pieces on the board as an integer.
numBlackPieces : int	Holds the number of black pieces on the board as an integer.

### Access Programs

#### setUpBoard(input : string)

Inputs	input
Outputs	pieceArray, numWhitePieces, numBlackPieces
Updates	None
Description	Parses input to be interpreted as Piece locations. Place Piece on correct Piece location using the PlacePiece() access program. numWhitePieces' = numWhitePieces + c and numBlackPieces' = numBlackPieces + d where c and d are between 0 and 12. pieceArray' = pieceArray with c + d more PieceObjects.

#### getPiece(col : int, row : int) : Piece

Inputs	col, row
Outputs	piece
Updates	None
Description	Returns the piece currently at the location specified.

#### placePiece(col : int, row : int, piece : Piece)

Inputs	col, row, piece
Outputs	None
Updates	pieceArray, numWhitePieces, numBlackPieces
Description	If piece placement is valid, it will put it there in the data structure. Either numWhitePieces' = numWhitePieces + 1 or numBlackPieces' = numWhitePieces + 1. pieceArray' = pieceArray with one more Piece object.

#### movePiece(fromCol : int, fromRow : int, toCol : int, toRow : int)

Inputs	None
Outputs	None
Updates	None
Description	Moves piece at said location to the location specified.

#### clear()

Inputs	None
Outputs	pieceArray, numWhitePieces, numBlackPieces
Updates	None
Description	Clears the board of all pieces. pieceArray' = Array of null objects, numWhitePieces' = 0 or numBlackPieces' = 0.

## 4.3 Game1 Module

### 4.3.1 Interface

<b>Types</b>	
state	enumerate if the game is in Menu, Setup, or Playing
<b>Constants</b>	
None	
<b>Access Programs</b>	
Update()	Allows the game to run logic such as switching state, updating the game, and gathering input.
Draw()	Draws the correct graphics on screen depending on the state.
takeInput()	Takes user input for setting up a board.

### 4.3.2 Implementation

<b>Variables</b>	
currentState : state	holds information of the current state
input : string	holds board setup from user
board : Board	
pieceList : List	Holds information of where to graphically place each piece.
<b>Access Programs</b>	
<b>Update()</b>	
Inputs	None
Updates	currentState
Outputs	None
Description	Changes the state based on keyboard press or mouse presses on graphical buttons.
<b>Draw()</b>	
Inputs	board
Updates	pieceList
Outputs	None
Description	Draws the buttons, board tiles and pieces in proper place on the screen. The piece locations are stored in pieceList. And we just loop through the graphics objects to draw them each frame.
<b>takeInput()</b>	
Inputs	input
Updates	None
Outputs	board
Description	Takes user input and sends it to the board using board.SetupBoard().

## 4.4 FileIO Module

### 4.4.1 Interface

<b>Types</b>	None
<b>Constants</b>	None
<b>Access Programs</b>	
	Save(Board : Board, Turn : Piece.player ) : void    Saves the current board state
	Load(Board : Board) : String    Loads the board with a previous board state

### 4.4.2 Implementation

<b>Variables</b>	
	path : String    holds the path to the location of where the save file is to be placed
<b>Access Programs</b>	
	<b>Save(Board : Board) : typeState</b>
	Inputs    Board, Turn
	Updates    None
	Outputs    None
	Description    Saves the current game session, it parses the current board state and saves it to a file.
	<b>Load(Board : Board)</b>
	Inputs    Board
	Updates    None
	Outputs    None
	Description    Loads a new game with a previous save file. This will return the board state and the current turn.

## 4.5 Input Module

### 4.5.1 Interface

<b>Types</b>	
	Mouse    enumeration of mouse button states
	Keys    enumerates keyboard buttons
<b>Constants</b>	None
<b>Access Programs</b>	
	GetState() : Mouse    Gets if mouse button is pressed.
	IsKeyDown(key : Keys) : bool    Checks if the key is pressed.



#### 4.5.2 Implementation

##### Variables

mouseState : Mouse	Holds if mouse is pressed.
mouseClickedPiece	Holds the graphical object the mouse is clicking on.
mousePos	Stores current mouse position.

##### Access Programs

###### **GetState()**

Inputs	None
Updates	None
Outputs	mouseState

###### **IsKeyDown(key : Keys)**

Inputs	None
Updates	None
Outputs	None

## 5 Internal Evaluation