

P3 - Runtime Terrors

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Omega Chess Recap

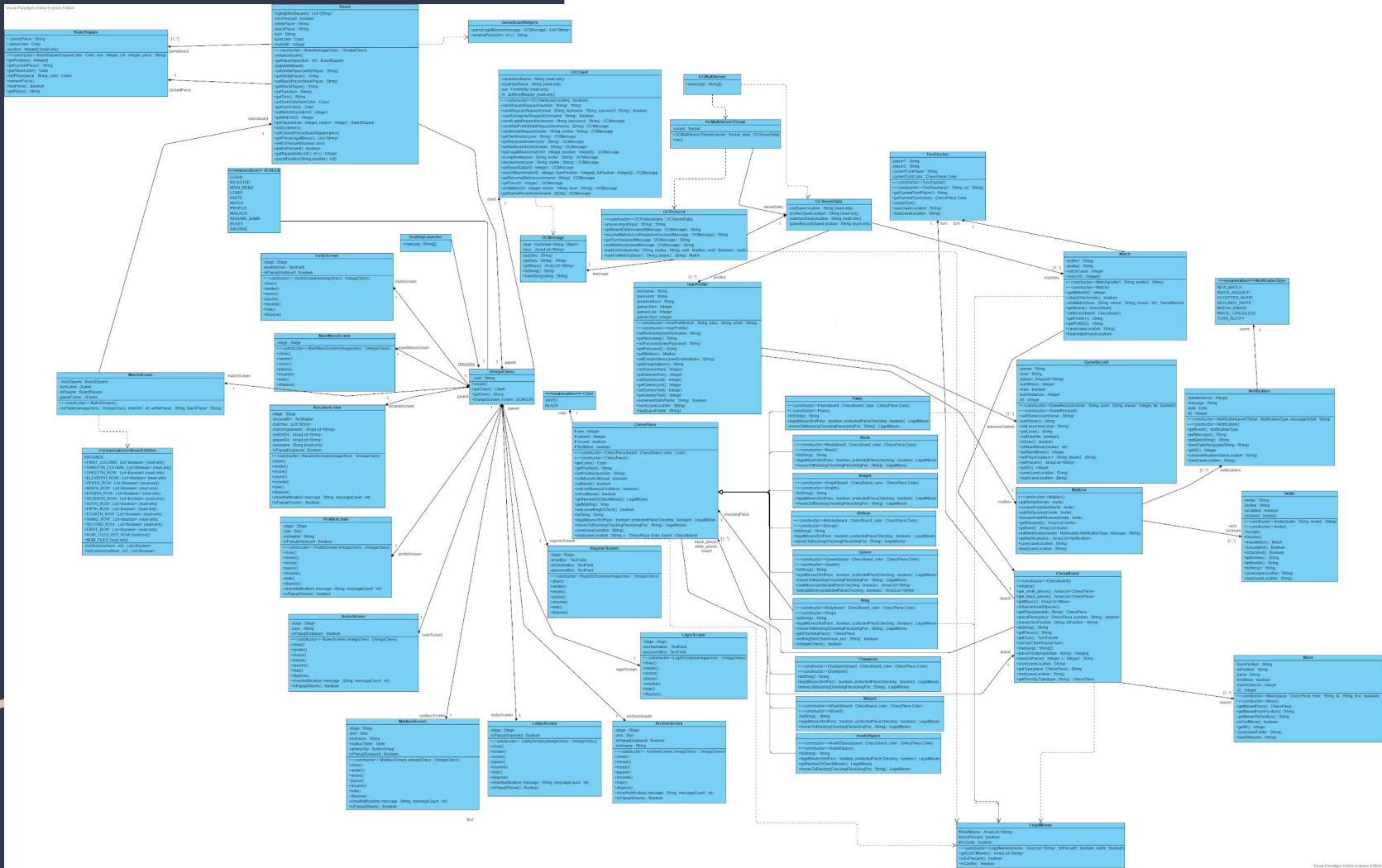
- Omega Chess is played on a 10x10 board and four “Wizard” squares at each corner.
- It has the same rules as chess except for the behavior of Pawns. The pawn can only move forward and in its initial position it can move one, two or three squares forward.
- There are two additional pieces in Omega Chess, the Champion and the Wizard.
- The Champion is like the Knight. It can move one square orthogonally forward, backward or to either side. It can also jump over these squares and also jump two square diagonally in all four directions.
- The Wizard can move one square diagonally in all four directions, or it can move as a Knight would, but three squares in one direction instead of two.

Processes/Practices /Tools

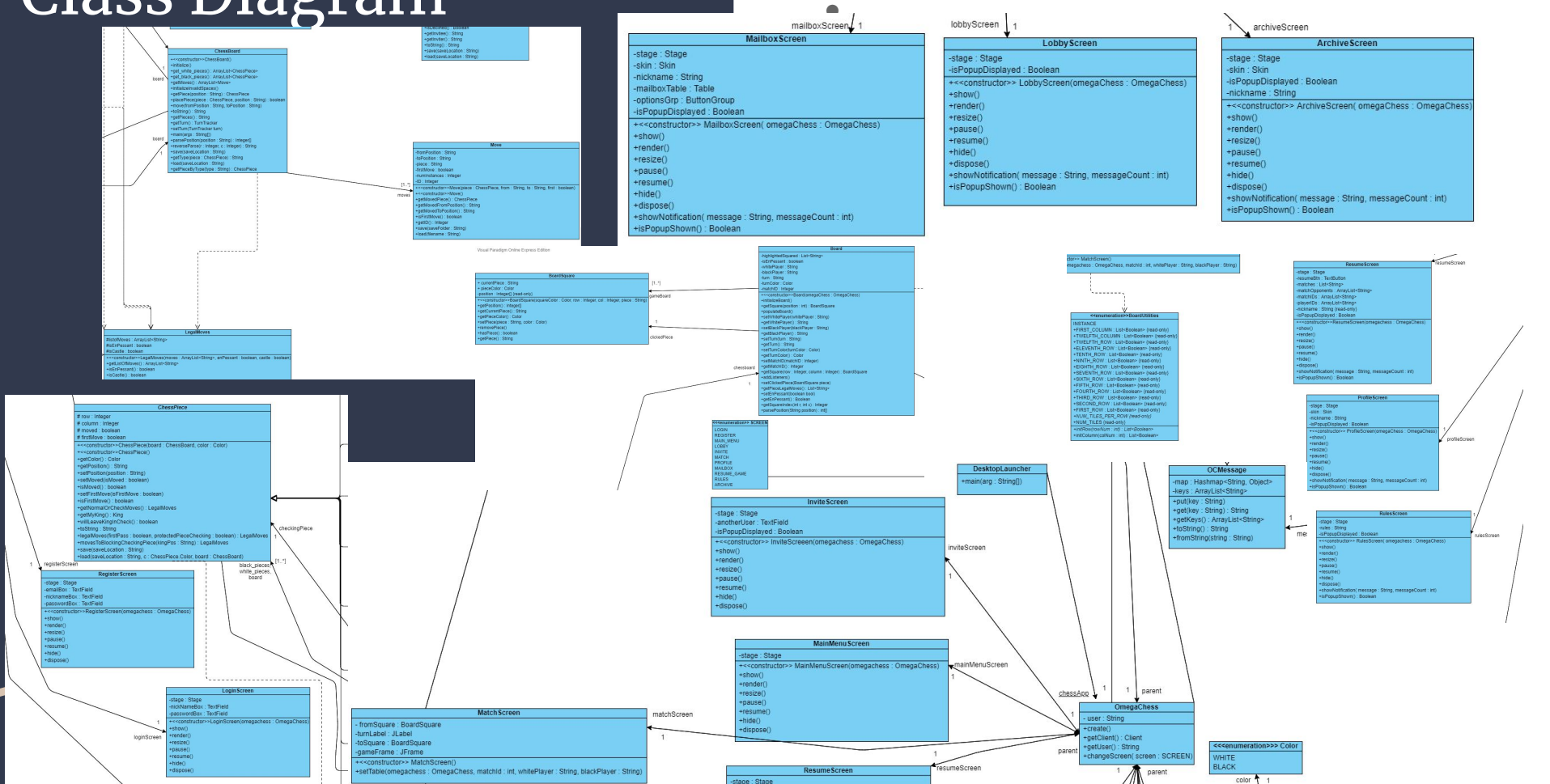
- Followed Agile Methodology with 2 week sprints, meetings with the PO, etc.
- GitHub Repository
- IntelliJ IDEA
- Gradle Build Tool
- Travis CI
- Junit Testing Framework
- LibGDX graphical library
- Java Swing graphical utilities

Design Patterns

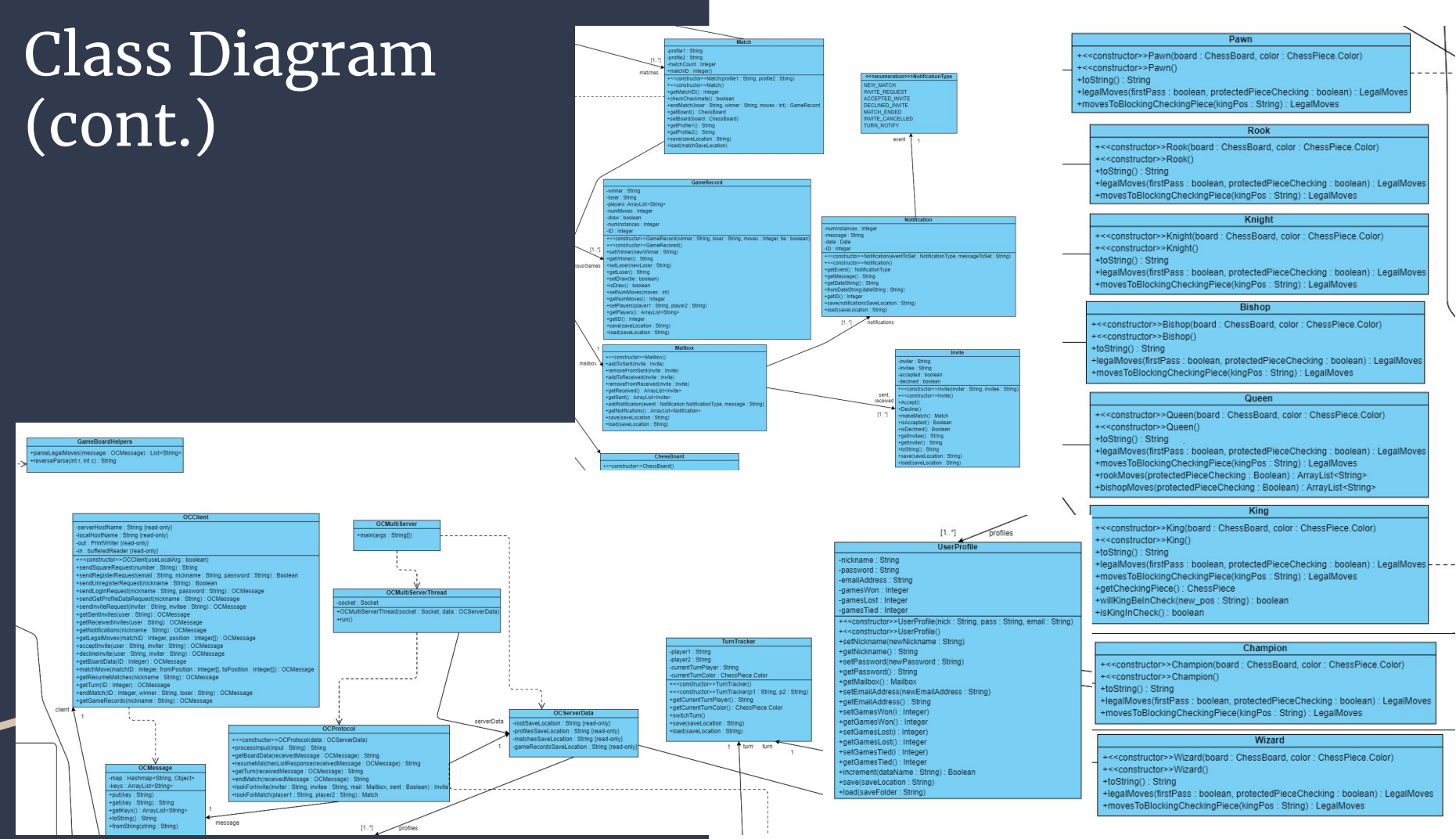
- We used the Command Pattern to communicate between our client and server. Our file “OCMessage.java” was used to encapsulate messages as objects that were then able to be read and processed by the server depending on the “process” variable that was set by the client. This pattern was a good fit because it allowed us to create multiple client requests and process them easily.



Class Diagram



Class Diagram (cont.)



Traceability Matrix

[illegible]

Traceability Matrix (cont.)

GameRecord	Invite	Mailbox	Match	Notification	server/.../omegachess/server/OCMessage	OCMultiServer	OCMultiServerThread	OCProtocol
					X	X	X	X
			X					
	X		X					
	X							
	X							
			X					
X			X					
			X					
			X					
	X	X		X				
			X					
					X			X

Traceability Matrix

(cont.)

OCServerData	TurnTracker	UserProfile	InviteScreen	LobbyScreen	LoginScreen	MainMenuScreen	MatchScreen	OCClient	core/.../game/OCMessage
X		X			X	X		X	X
							X		
	X		X						
							X		
		X							
		X							
	X								
	X								
				X					
							X		
							X		
X	X						X		

Traceability Matrix (cont.)

OmegaChess	ProfileScreen	RegisterScreen	BoardSquare	ArchiveScreen	MailboxScreen	ResumeScreen	RulesScreen
X		X					
					X		
						X	
				X			
	X						
						X	
				X			
					X		
							X
			X				
			X				

Demo

Shows:

- Registering
- Inviting
- Getting a notification
- Accepting an invitation
- Viewing Profile
- Viewing Mailbox
- Viewing Current Games
- Moving Pieces
- Forfeiting
- Logging out

Demo Pt2

Shows:

- Logging in
- Viewing Current Games
- Moving Pieces
- Viewing Profile
- Viewing Archive
- Unregister

Kanban Board Start of P3

The screenshot displays a Jira Kanban board for the start of P3. The board is organized into columns representing different stages of the workflow, with a search bar at the top right and a 'New Issue' button.

Columns and their contents:

- Unplanned Epics:** Contains two epic issues: 'cs414-120-runtimerrors #79 Friends system' and 'cs414-120-runtimerrors #78 Friend invite system'. Both have a 'Filter by Epic Issues' button.
- Product Backlog (MegaEpic...):** Contains several epic issues: 'cs414-120-runtimerrors #10 Game/Match', 'cs414-120-runtimerrors #6 Archive', 'cs414-120-runtimerrors #7 Invitations', 'cs414-120-runtimerrors #9 Notifications', 'cs414-120-runtimerrors #8 Graphical Interface', and 'cs414-120-runtimerrors #197 Match Continue'. Each has a 'Filter by Epic Issues' button.
- Product Backlog (Epic/T...):** Contains several task issues: 'cs414-120-runtimerrors #75 Surrounding graphics', 'cs414-120-runtimerrors #68 Card that lists who won, how many moves', 'cs414-120-runtimerrors #43 Button/card to enter game', 'cs414-120-runtimerrors #39 Button to return to lobby from in-game', 'cs414-120-runtimerrors #62 Forfeit button', 'cs414-120-runtimerrors #256 Implement Change Password Button', 'cs414-120-runtimerrors #257 Implement Change Nickname Button', and 'cs414-120-runtimerrors #231 failed to connect to the server screen/message'. Each has a 'Filter by Epic Issues' button.
- Icebox:** Contains two epic issues: 'cs414-120-runtimerrors #22 View history from previous games' and 'cs414-120-runtimerrors #103 Archives Screen to show users a list of previous games and whether they won or lost the match'. Both have a 'Filter by Epic Issues' button.
- Backlog:** Contains several task issues: 'cs414-120-runtimerrors #17 Select an in-progress game', 'cs414-120-runtimerrors #334 Pull in-progress game data', 'cs414-120-runtimerrors #32 Screens', 'cs414-120-runtimerrors #44 History button', 'cs414-120-runtimerrors #249 Server Requests - Match/Board', 'cs414-120-runtimerrors #85 Automatically update clients if they are open with a move', 'cs414-120-runtimerrors #295 Update client with board from server', and 'cs414-120-runtimerrors #16 Accept/decline a match from a list to play'. Each has a 'Filter by Epic Issues' button.
- In Progress:** Contains several task issues: 'cs414-120-runtimerrors #333 Sprint retrospective', 'cs414-120-runtimerrors #29 Result Alert', 'cs414-120-runtimerrors #65 Alert users of finished games if they are not in the match', 'cs414-120-runtimerrors #27 Viewer For Notifications', 'cs414-120-runtimerrors #52 Show users a list of their notifications when they click on the Mailbox button', 'cs414-120-runtimerrors #281 Gameboard move functions', and 'cs414-120-runtimerrors #332 Update pawn promotion for client'. Each has a 'Filter by Epic Issues' button.
- Done/Review/QA:** Contains several task issues: 'cs414-120-runtimerrors #342 Sprint retrospective', 'cs414-120-runtimerrors #318 Rule Screen', 'cs414-120-runtimerrors #56 Create a method for sending a user an in-game popup', 'cs414-120-runtimerrors #55 When a new notification is added to a player's mailbox, send them a pop-up if they are in game', 'cs414-120-runtimerrors #88 Notification Alert', 'cs414-120-runtimerrors #28 In-Game New Notification Alert', and 'cs414-120-runtimerrors #338 Notifications tasks'. Each has a 'Filter by Epic Issues' button.
- Closed:** Contains several task issues: 'cs414-120-runtimerrors #337 Added daily scrum' and 'cs414-120-runtimerrors #336 Get turn'. Each has a 'Filter by Epic Issues' button.

Kanban Board Middle of P3 (Sprint 1)

Repos (1/1) **Labels** **Milestones** **Assignees** **Epics** **Releases** **Estimates** **Authors**

Find Issues (+) **New Issue** **+**

Backlog 0 Story Points

- cs414-120-runtimerrors #77 Friend system
- Filter by Epic Issues
- Epic

In Progress 5 Story Points

- cs414-120-runtimerrors #75 Surrounding graphics
- Sprint 4
- Graphical Interface
- Filter by Epic Issues
- Epic
- cs414-120-runtimerrors #43 Button/card to enter game
- Sprint 4
- Surrounding graphics
- Task
- cs414-120-runtimerrors #249 Server Requests - Match/Board
- Sprint 4
- Game/Match
- Filter by Epic Issues
- Epic
- cs414-120-runtimerrors #85 Automatically update clients if they are open with a move
- Sprint 4
- Server Requests - Match/Board
- Task
- cs414-120-runtimerrors #32 Screens
- Sprint 4
- Graphical Interface
- Filter by Epic Issues
- Epic
- cs414-120-runtimerrors #240 Match Screen
- Sprint 4
- Screens
- Task
- cs414-120-runtimerrors #295 Update client with board from server
- Sprint 4
- GameBoard move functions
- Task

Done/Review/QA 0 Story Points

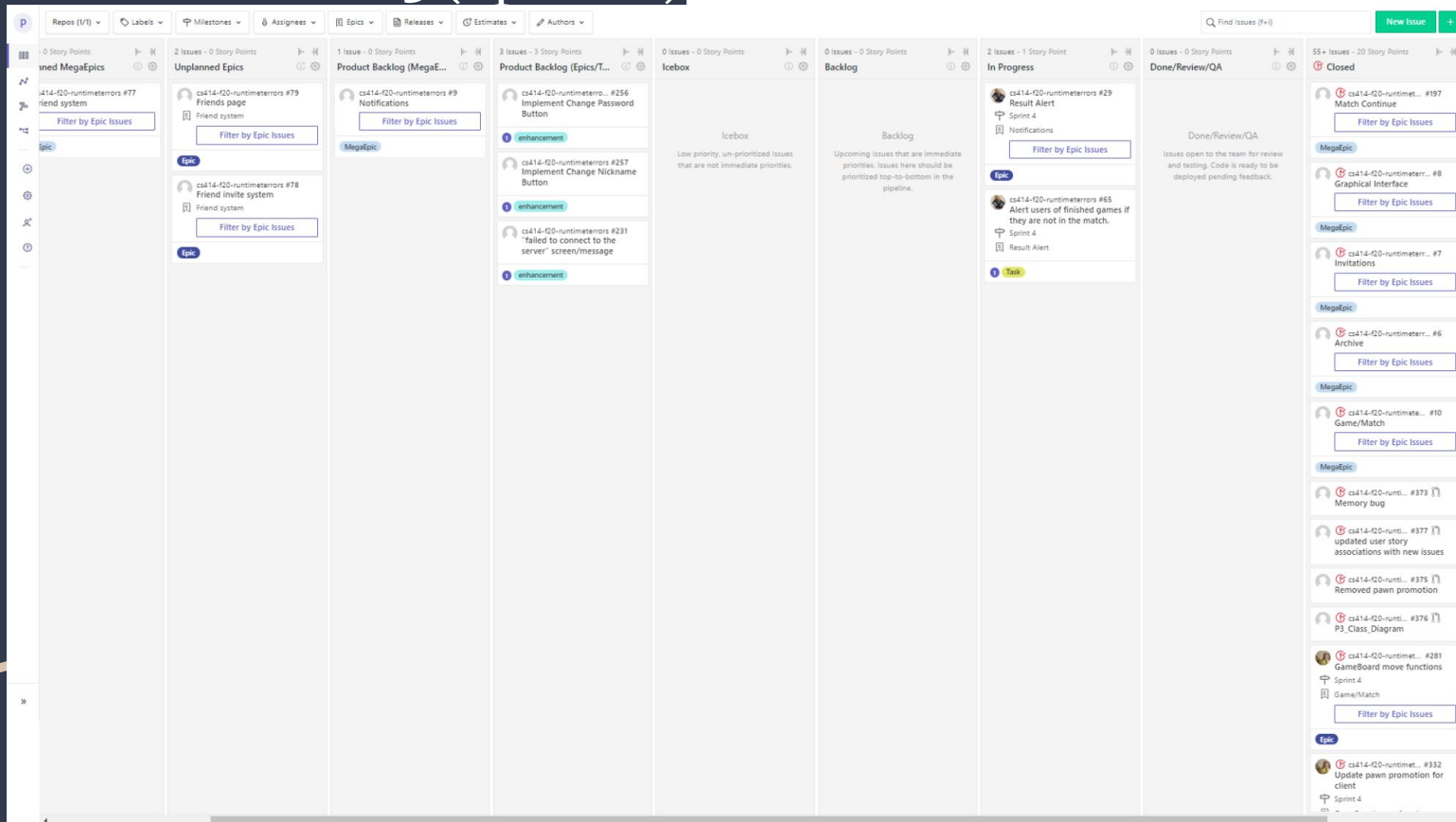
Done/Review/QA

Issues open to the team for review and testing. Code is ready to be deployed pending feedback.

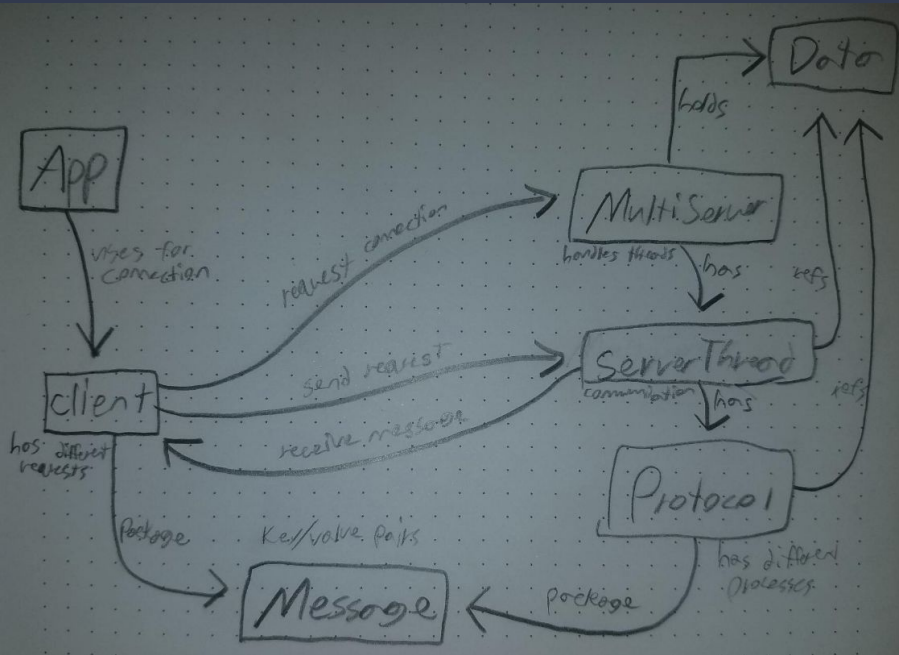
Closed 50+ Issues - 40 Story Points

- cs414-120-runt... #354 Fixed King capturing in check bug
- cs414-120-runt... #353 King can capture a protected piece
- Sprint 4
- cs414-120-runt... #352 fixed not showing notifications on local server
- cs414-120-runt... #27 Viewer For Notifications
- Sprint 4
- Notifications
- Filter by Epic Issues
- Epic
- cs414-120-runt... #52 Show users a list of their notifications when they click on the Mailbox button.
- Sprint 4
- Viewer For Notifications
- Task
- cs414-120-runt... #351 able to view notifications in mailbox
- cs414-120-runt... #44 History button
- Sprint 4
- View history from previous games
- Surrounding graphics
- Task
- cs414-120-runt... #350 Scrum 11/18/2020
- cs414-120-runt... #349 added history button and barebones archive screen
- cs414-120-runt... #348 Move Fix
- cs414-120-runt... #346 Can no longer send an invite to someone who has sent you an invite

Kanban Board End of P3 (Sprint 2)



Server Setup



The **MultiServer** was made using java sockets. It waits for new connections to pair with a new **ServerThread**.

The **App** uses a **Client** class as its interface to the **MultiServer** and calls request methods based on user input.

The **Client** establishes a connection with the **MultiServer** and gets assigned a **ServerThread**. It has requests that it can send to the **ServerThread** on behalf of the **App**.

The **ServerThread** reads the content of requests and sends responses back to the **Client** according to the **Protocol**.

The **Protocol** accesses the **Data** in order to fulfill requests.

Both the **Client** and the **Protocol** package messages to be sent using a custom **Message** class, which is essentially a String-to-String HashMap that is capable of being turned into a string and back.

Current Supported Requests

Register

Unregister

Login

Get Profile Data

Send Invite

Get Sent Invites

Get Received
Invites

Get Notifications

Invite Response

Get Board Data

Get Legal Moves

Match Move

Get In-Progress Matches

Get Turn

Get Game Records

End Match

Check Checkmate

Check Forfeit

Completed User Stories (for P3)

#6 "As a user, I can participate in multiple games at the same time."

#7 "As a user, I can forfeit from any game at any time."

#9 "As a user, I can view history statistics from previous games."

#11 "As a user, I can make the first move if I create the match."

#12 "As a user, I can return to a saved game."

#13 "As a user, I can see the end result of a game I participate in."

#16 "As a user, I will be able to quit the game using a Quit button."

#18. "As a user, when I choose to move a piece the board will show where I can move the piece."

Incomplete User Stories

#10 “As a user, I can view a user profile if registered.”
(Would Have)

#14 “As a user, I will be alerted when a user
accepts/declines an invitation, when it is my turn, or a
game I am participating in is over.” (Could Have)

User Story Acceptance Criteria

(for completed user stories)

#6 As a user, I can participate in multiple games at the same time.

- a) Test that a user can have multiple games happening at the same time (pass)

#7 As a user, I can forfeit from any game at any time.

- a) Test that a user can hit the forfeit button and the game is ended (pass)
- b) Test that if a user tries to forfeit, a confirmation window is shown asking the user if they are sure they want to forfeit (pass)
- c) Test that when a user forfeits a game, it shows that they lost a game in their match history (pass)

#9 As a user, I can view history statistics from previous games.

- a) Test that after a game is finished, user can go to profile and history and view the correct statistics from that game (pass)
- b) Test that order of history is oldest first (pass)

#11 As a user, I can make the first move if I create the match.

- a) Test that if a user creates the match, they get to make the first move (pass)

User Story Acceptance Criteria (continued)

#12 As a user, I can return to a saved game.

- a) Test that after a user can hit a back button to return to the lobby (pass)
- b) Test that if a user hits back to exit the game and then clicks the game to open it again, it returns with the saved most recent data (pass)

#13 As a user, I can see the end result of a game I participate in.

- a) Test that if I am currently in the game, a banner/end result screen of some sort pops up with the results (pass)

#16 As a user, I will be able to quit the game using a Quit button.

- a) Test that the Quit button will quit from a game (pass)
- b) Test that a confirmation popup appears asking the user if they are sure they want to quit and exit this game (pass)

#18 As a user, when I choose to move a piece the board will show where I can move the piece.

- a) Test that when it is a users turn, they can click on one of their pieces and it will show the possible spots they can move it to (pass)
- b) Test that if the user selects an opponent's piece, it will not show where that piece could move (pass)

CRC Cards

OmegaChess

- Has user String for the current user
- Has Enumeration SCREEN
- Is the core of our program, it launches the client which processes requests from the different screens and sends them to the server.

OCClient

- Has objects serverHostName, localHostName, hostName, portNumber, socket, out, and in
- OmegaChess
- OCMessages

OCMessage

- Has objects map and keys
- Converts a request and response to and from a string for Server-Client communication
- OCClient
- OCMessages

OCMultiServer

- Listens for new connections from clients
- If the connection is successful it passes the client to a new OCMultiServerThread

OCMultiServerThread

- Uses OCMessages to process requests from the client
- OCMultiServer

OCProtocol

- Processes requests sent from the client and returns an OCMessages as a String to the client
- OCMultiServerThread

OCServerData

- Has objects profiles, matches, and previousGames
- Stores variables on the server to allow users to come and go as they please
- OCMultiServer
- OCMultiServerThread
- OCMessages

MainMenuScreen

- Has objects stage, loginBtn, registerBtn, and exitBtn
- Choose a screen from login or register
- OmegaChess
- OCClient

CRC Cards (continued)

InviteScreen

- Has objects stage, submit, home, opponentName, anotherUser
- Sends invite request to the server from the client

- OmegaChess
- OCClient

LoginScreen

- Has objects stage, loginBtn, backBtn, nickNameBox, passwordBox
- Sends login request to the server
- Logs the user in and takes them to the lobby screen

- OmegaChess
- OCClient

RegisterScreen

- Has objects stage, registerBtn, backBtn, emailBox, nickNameBox, and passwordBox
- Checks password strength
- Sends a register request to the server then returns to MainMenuScreen

- OmegaChess
- OCClient

RulesScreen

- Has rules
- Shows the rules of Omegachess to the user

- OmegaChess

LobbyScreen

- Has objects stage, createGameBtn, resumeGameBtn, logoutBtn, profileBtn, and exitBtn
- Gives the player the option to view their profile, send an invite to another user, and resume a match they are in

- OmegaChess

ProfileScreen

- Has objects, stage, unregisterBtn, lobbyBtn, changePwBtn, changeNicknameBtn, skin, style_label, nickname
- Displays the User's information
- If you are viewing your own profile option to change nickname and password
- View the users win/loss/tie ratio
- Sends a request to the server to get the user's data

- OmegaChess
- OCClient

MailboxScreen

- Has objects outBox, inBox, outCount, inCount,
- Has a button to show the user their outBox/inBox
- When viewing outBox cancel an invite
- When viewing inBox accept/decline an invite

- OmegaChess
- OCClient

ArchivesScreen

- Has objects stage and nickname of the current user
- Show previous games that the user has won and lost

- OmegaChess
- OCClient

CRC Cards (continued)

BoardSquare

- Has currentPiece
- Contains the sprite of the currentPiece on it
- Highlights if it is contained in the legalMoves of a piece
- MatchScreen

GameRecord

- Has objects winner, loser, players, numMoves, and draw
- Creates an object that holds the results of a game
- Stores it in the OCServerdata/UserProfile
- OCServerData

UserProfile

- Has objects nickname, password, emailAddress, gamesWon, gamesLost, gamesTied, playedWith, and mailbox
- Stores the data of a user
- OCServerData

Mailbox

- Has objects sent and received
- Holds lists of sent and received invites between other users
- UserProfile

Invite

- Has objects inviter, invitee, accepted, and declined
- Send an invite to a user you deem by their username
- Mailbox
- OCMultiServer

Notification

- Has objects event, message, date
- Notifies the user if they have any change in their mailbox
- Notify if you have a game request
- Notify if someone accepts/declines game invite
- Mailbox
- OCMultiServer

CRC Cards (continued)

Match

- Has objects board, player1Pieces, player2Pieces, and turn
 - The match is the instance of a game between two players.
 - I keeps track of the current board state
 - When a game is ended it sends a notification to the server regarding if it was ended by forfeit or Checkmate
- OCServerData

TurnTracker

- Has objects player1, player2, currentTurnPlayer, and currentTurnColor
 - Keeps track of whose turn it is
- Match

ChessBoard

- Has objects moves, black_pieces, white_pieces, and board
 - Allows a piece to move based on its list of legalMoves
- Match
 - ChessPiece

Abstract

ChessPiece

Pawn, Rook, Knight, Bishop, Queen, King, Champion, Wizard

- Has objects row, column, and moved
 - Has Enumeration Color
 - Returns a list of Moves as a piece's legalMoves
- ChessBoard
 - Move

LegalMoves

- Has objects listofMoves, isEnPessant, and isCastle
 - This is a helper class for holding the legal moves of a piece
- ChessPiece

MatchScreen

- Has objects chessBoard, fromSquare, toSquare, and turnLabel
 - Show the users a game board to play against another user
 - Shows the users the name of the user of whose current turn it is
 - When a game is ended it shows a pop-up regarding what happens
 - Players take turns, preventing the users from moving pieces when it is not their turn.
 - Players are able to return to the lobby or forfeit a match
- OmegaChess
 - OCClient

Sprint 3

11/2 to 11/16

Statistic	# Planned	# Completed
Epics	7	2
Tasks	45	36
Story Points	73	62

Burndown report

☐ Weekends ☐ Ideal ☐ Completed



62 Total Story Points

62 Completed / 0 Remaining

38 Total Issues and Pull Requests

38 Completed / 0 Remaining

Sprint 4

11/16 to 12/6

Statistic	# Planned	# Completed
Epics	8	7
Tasks	18	17
Story Points	23	22

Burndown report

☐ Weekends ☐ Ideal ☐ Completed



23 Total Story Points

22 Completed / 1 Remaining

26 Total Issues and Pull Requests

24 Completed / 2 Remaining

Lessons Learned

- Thoroughly research the frameworks you want to use. Using the LIBGDX framework we encountered a memory leak that caused a crash. We ended up having to change that screen out for a Java Swing screen at the last minute which causes our screens to look different and not be cohesive.
- Diagramming the classes of your programs can be enlightening and show problems with coupling and cohesion.
- There are always improvements to be made and new design patterns and tools that can make your application better.
- Always meet with the PO to make sure everyone is on the same page and that they are happy.