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CSE 310 Final Project Server Documentation

========================**USER DOCUMENTATION**=======================

**OBJECTIVE OF REVERSE TIC-TAC-TOE**

The game has two players and involves a 3x3 board. One player will use ‘X’ pieces, while the other uses ‘O’ pieces. The two players will alternate and place their pieces onto the board one at a time. The first player to place three pieces in a straight line loses the match. If there are no more available spots on the board but neither player has three pieces in a straight line, then the match is a draw.

**SETTING UP A SERVER**

**INSTRUCTIONS**

1. Run server.py in a command line

**RUNNING THE CLIENT**

**COMMANDS**

help this command takes no argument. It prints a list of supported commands, which are ones in this list. For each command, it prints a brief description of the command function and the syntax of usage.

login this command takes one argument, your name. A player name is a userid that uniquely identifies a player. Your name is entered with this command and is sent to the server.

place this command issues a move. It takes one argument n, which is between 1 and 9 inclusive. It identifies a cell that the player chooses to occupy at this move.

exit the player exits the server. It takes no argument.

**INSTRUCTIONS**

1. Run client.py in a command line with two additional arguments:

1. The name of the machine running the server

2. The port number that the server is listening at

If the machine you are trying to connect to is not running the server or does not exist, or if the port number is incorrect, then you will receive an error message with the reason for the error.

2. After connecting to the client, use the “login” command followed by a username. If the username is not already taken, then it will become your username. Otherwise, the server will return an error message stating that the username is unavailable and the user must use the login command again. Using the “place” command at this stage will return an error message and nothing else will happen.

3. Once you have logged in, the client will then wait until the server has two players to begin a new match of reversed tic-tac-toe. Once the server finds two players, a new match of reverse tic-tac-toe will automatically begin, and your client will display the tic- tac-toe board as well as the opponent’s username.

At any time, you may use the command ‘exit’ to exit the server and log out, ending any active matches.

4. You will be notified via command line when it is your turn. During your turn, use the “place” command followed by the position on the board that you wish to place your piece on. If the position is already occupied, or the number you entered is invalid, you will receive an error message and must use the “place” command again to make your move. Using the “place” command when it is not your turn will return an error and nothing else will happen. After successfully making a move, the client will display the updated tic-tac-toe board and you must wait for the other player to make his/her move.

5. Once one player has 3 pieces in a row or if the board is fully occupied, the client will display whether you won, lost, or drew. You will then automatically wait for another match to begin.

6. To stop playing, use the “exit” command.

=======================**SYSTEM DOCUMENTATION**======================

**REVERSE TIC-TAC-TOE PROTOCOL**

**METHODS:**

**200 LOGIN**

The LOGIN method means an attempt to for a client to log into the server. The contents of the request includes an ID set by the user.

**211 PLACE**

The PLACE method means an attempt for a client to place a piece on the tick-tac-toe board. The contents of the request includes the position on the board in which the player wishes to place a piece on.

**212 EXIT**

The EXIT method means that a client has exited from the game.

**STATUS CODES:**

**200 OK**

The request has succeeded. The information returned with the response is dependent on the method used in the request, for example:

PLACE the status of the newly updated tick-tac-toe board

**213 WAIT**

The WAIT status code is used for two scenarios:

1. The login request is successful, but there are not enough players to begin a match. The client must wait for a match to begin.

2. The client is participating in a match, but it is the other player's turn to make a move. The client must wait for the other client to make a move before it can make one.

**214 START**

There are enough players to begin a match, and a match has begun.

**215 GO**

It is the current player’s turn in the match

**216 WON**

The match has ended and the client has won

**217 LOST**

The match has ended and the client has lost

**218 TIED**

The match has ended and both clients tied

**219 NAME**

Contains the name of the opponent player

**220 LEFT**

The opponent player has left the match, and the match has ended.

**221 DISPLAY**

The game board has been updated. Contains the status of the game board.

**222 WHO**

**223 GAMES**

**224 PLAY**

**400 ERROR**

**REVERSE TIC-TAC-TOE SERVER**

**LANGUAGE**

Python 3.5

The server is initiated by running server.py, which has 3 classes: a server class, a player class, and a game class.

**SERVER CLASS**

The server class contains global variables for each of the protocol methods and status codes, which can be found in section 1.1 and 1.2 in this documentation, as well as local variables:

numPlayers the number of players waiting for or in an active game

nameList a list of IDs of current players; used to check if an ID is available for login

player1 a Player object to represent the first player in a match

player2 a Player object to represent the second player in a match

game a Game object to represent status of the match

The server class runs an indefinite loop, accepting all connections and returning a “200 OK” protocol message to connected clients upon connecting. In each loop, the server waits for two clients to log into to the server.

Clients log into the server by sending a “210 LOGIN” protocol message, after which the server checks to see if the ID associated with the login message is available. If it is available, the server increments the number of players and instantiates a Player object with an ‘available’ status to represent the player. Otherwise, the server sends a “400 ERROR” protocol message back to the client. All other protocol messages during this time are rejected and the server sends a “400 ERROR” protocol message back to the client.

If a client connects and there are no

Once there are two concurrent clients connected, the server instantiates a Game object with an ‘active’ status, sets the status of both players to ‘busy’ and sends the opposite player’s ID to each of the two players.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*Placeholder\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**PLAYER CLASS**

**REVERSE TIC-TAC-TOE CLIENT**

**LANGUAGE**

Python 3.5

**MODULES**

sys used to obtain command line arguments at compilation

socket used to connect the client to a server socket to exchange messages

**GLOBAL VARIABLES**

The client contains a global variable for each of the protocol methods and status codes, as well as two variables for the port and hostname:

PORT the port number that the server is listening at. Defaults to ‘1337’

loggedIn a flag to indicate whether or not the client is logged into a server. Defaults to False

**FUNCTIONS**

**main()** this is the main function of the client, and is the only function executed by the client

**CODE**

**MAIN**

Lines Description

44-47 “len(sys.argv)” returns the number of arguments passed into the command line at run time. The python script must be run with 3 arguments: the python file name, the hostname of the computer running the server program, and the port the server is listening at. Any other number of arguments will print an error and terminate the program.

49-66 “sys.argv[1]” is the argument following the python file name. This is expected to be the hostname of the server.

“sys.argv[2]” is the second argument following the python file name. This is expected to be the port number that the server is listening at. In this implementation, the server’s port is always ‘1337’.

“try: portNumber = int(sys.argv[2])” converts the port number argument from a string to an integer. If the argument was not a number, then an error is thrown and caught by “except ValueError:”, which prints an error message and terminates the program. If the argument was not ‘1337’, then an error message is printed and the program is terminated.

“clientSocket = socket(AF\_INET, SOCK\_STREAM)” initializes the client socket that will be used to establish a connection with the server.

“clientSocket.connect((HOST, PORT))” connects the client socket to the server. If the connection was refused, the server hostname entered was invalid and an error message is printed and the program terminates.

68-74 “clientSocket.recv(1024).decode().split()” decodes a message received from the connected server and splits it into a list separated by spaces. If the first entry in the list is the protocol number for “OK”, the server has accepted the connection. Otherwise, the connection was rejected and the client program terminates.

76-631 An indefinitely running loop that handles all input from the player as well as all messages received from the server.

“arguments = input("> ").split()” prints “> “ to the command line and waits for the user to enter a command into the command line, which is split into a list separated by spaces named ‘arguments’.

80 If the input was empty, then the loop begins again. Otherwise, the loop checks the input to determine if it is a valid command and acts accordingly.

83-101 Checks if the input was “help” and prints the help message if true.

103-351 Checks if the input was “login” followed by an argument (the username).

If true, the login command is executed.

“loginMessage = LOGIN + " " + arguments[1]” creates a string named ‘loginMessage’ with the LOGIN protocol and the player’s username.

“clientSocket.send(loginMessage.encode())” encodes and sends the login protocol to the server.

“response = clientSocket.recv(1024).decode()” waits for and receives a response from the server, and then decodes the message.

“tokenized = response.split()” splits the decoded response message into a list separated by spaces. The first entry in the list is then checked to see if an “OK” protocol message was returned, which will then continue the loop, or if an “ERROR” protocol message was returned, which will print an error and the loop will begin again.

If the message was an “OK” protocol message, then the global variable logedIn is set True and the client then waits for another response from the server.

127-236 If the next message received is a “WAIT” protocol message, then there are not enough players to begin a match and the client waits until it receives a “START” protocol message to indicate that a match has begun.

Once the “START” protocol message has been received, the client waits for a “NAME” protocol message containing the name of the opponent, and prints the name of the opponent once it receives the message.

Then the client then waits for a “DISPLAY” protocol message containing the contents of the board, after which it will notify the player that the game has begun and will print out the board and waits for the next response.

If the next response is a “GO” protocol message, the client will notify the user that it is his turn and the loop will restart to handle the user’s next input.

Otherwise, if the response is a “WAIT” protocol message, the client will notify the user that it is the other player’s turn.

The client waits for a “DISPLAY” protocol message and updates and prints the board upon receiving it and waits for the next response from the server.

If the next response is a “GO” protocol message, the loop will restart to handle the user’s next input.

If the next response is a “LEFT” protocol message, the opponent left the match and the client waits for another match to begin.

**======================TESTING DOCUMENTATION**======================