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//Final Java Project

/*
Psuedocode:
 - Welcome the user and print instructions.
 - Create new int named 'turnCounter'.
 - Create for loop that incorporates the turn counter.
 - When user selects a space, that space becomes false
 - The computer then goes (random number generator between 1 and 9 kicks in)
 - If the computer selects a space that is already selected, it will select again
 - Once computer selects, that space becomes false (provided it's true to begin with)
 - Loop continues until the final turn (5th)
 - However, if the following occurs, the loop will terminate and whoever achieves the feat
wins the game:
         > Space 1 = Space 2 = Space 3 (Horizontal)
        OR Space 4 = Space 5 = Space 6 (Horizontal)
        OR Space 7 = Space 8 = Space 9 (Horizontal)
        OR Space 1 = Space 4 = Space 7 (Vertical)
        OR Space 2 = Space 5 = Space 8 (Vertical)
        OR Space 3 = Space 6 = Space 9 (Vertical)
        OR Space 1 = Space 5 = Space 9 (Diagonal)
        OR Space 3 = Space 5 = Space 7 (Diagonal)
 */

//Import Scanner and Random classes, and the IO
import java.util.Scanner;
import java.util.Random;
import java.io.*;

public class KylesTicTacToe {

   //Displays the instructions on how to play.
   public static void instructionsTicTacToe(){
      System.out.println("Welcome to Tic Tac Toe! \n");
      System.out.println("How to play:");
      System.out.println("1. Select either X or O to use.");
      System.out.println("2. Pick an integer between 1 or 9.");
      System.out.println("3. Wait for the computer to select a space.");
      System.out.println("4. Repeat Steps 2 to 4 until either you win, the computer wins, or
a tie occurs. \n");
   }

   public static void main (String[] args) throws IOException {

      //Scans for keyboard inpit
      Scanner keyboard = new Scanner(System.in);

      //Declares gameName of type string
      String gameName;

      //Prompts the user for their name for record keeping purposes
      System.out.print("Enter your name: ");

      //User's input becomes assigned to gameName
      gameName = keyboard.nextLine();

      //Enter new printWriter object, writing to "TicTacToe_Record.txt"
      FileWriter gameRecord = new FileWriter("TicTacToe_Record.txt", true);

        //Determines is space is playable. True means it is playable.
      boolean[] space = {true, true, true, true, true, true, true, true, true};
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        //Holds the marker the user plays (X or O) or if 9 is typed, exits the program.
      int userInt;

      //Invokes the Instructions method
      instructionsTicTacToe();

        //Prompts user for which marker they would like to play
      System.out.println("What marker would you like to use?");
      System.out.print("Press 0 for X, 1 for O, or 9 to quit: ");
      userInt = keyboard.nextInt();

      //Declare computer, user and blank variables, of type string
      //These mark the space X or O based on what marker the user plays
      String user;
      String computer;
      String blank = " ";

      //If else statement that determines X or O for each player based on the user input
above
      if (userInt == 0) {
         user = "X";
         computer = "O";
      }
      else{
         user = "O";
         computer = "X";
      }

      //If user selects 9, the program will exit.
      if (userInt == 9){
         System.exit(0);
      }

      //If something other than X or O are selected, then the program will exit.
      if (userInt != 0 && userInt != 1) {
         System.out.println("Not a valid input. Please select either 0 or 1.");
         System.exit(0);
      }

      //Prints out which player is X and which player is O.
      System.out.println("You are " + user + ", and computer is " + computer);

       //Which space (1-9) is played.
      int spacePlayed;

       //Determines if space belongs to user or computer; 0 = none; 1 = user; false =
computer; blank = neither.
      int[] spaceDes = {0,0,0,0,0,0,0,0,0};

       //Determines if space is marked with X or O
      String[] spaceMark = {" ", " ", " ", " ", " ", " ", " ", " ", " "};

       //Loops until the final turn by default
      for (int turn = 1; turn <= 5; turn++) {

         System.out.println("\n" + gameName + ": Turn " + turn + " out of 5");

         //Declare userDoAgain, type boolean.
         boolean userDoAgain = true;

         //While the userDoAgain is true, the loop will keep occurring.
         while (userDoAgain == true){

            //If else statement that is executed based on turn count
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            //If it is turn 1, the 'board' with space numbers will be printed
            //along with the prompt asking the user which space they wish to select first
            if (turn == 1){
               System.out.println("");
               System.out.println("|===========|");
               System.out.print("| " + "1");
               System.out.print(" | " + "2");
               System.out.println(" | " + "3" + " |");
               System.out.println("|===========|");
               System.out.print("| " + "4");
               System.out.print(" | " + "5");
               System.out.println(" | " + "6" + " | ");
               System.out.println("|===========|");
               System.out.print("| " + "7");
               System.out.print(" | " + "8");
               System.out.println(" | " + "9" + " | ");
               System.out.println("|===========|" + "\n");

               System.out.print("Which space would you like to play first? Press 0 to quit.
");
            }else{ //If the turn is NOT one, then only the prompt will print.
               System.out.print("Which space would you like to play next? Press 0 to quit.
");
            }

            //Takes user's input
            spacePlayed = keyboard.nextInt();

            //Switch statement executes based on the user's input above
            switch (spacePlayed) {

               //If Space 1 is played...
               case 1:

                  if (space[0] == true) { //Meaning the space is unoccupied
                     spaceDes[0] = 1; //Space becomes 'taken' by the user
                     if (spaceDes[0] == 1){
                        spaceMark[0] = user; //The space is marked with an X or O based on
which marker the user plays
                        userDoAgain = false; //The while loop userDoAgain is broken, so the
game continues
                     }
                     space[0] = false; //The space is marked false, so it cannot be played
again.
                  }
                  else { //If the space is already false
                     System.out.println("You may not play Space " + spacePlayed); //This
message is printed
                     userDoAgain = true; //The while loop is executed, and the user is
prompted for which space they wish to play next
                  }
                  break;


               //Comments on case 1 apply to cases 2 through 9 as well.
               case 2:
                  if (space[1] == true) {
                     spaceDes[1] = 1;
                     if (spaceDes[1] == 1){
                        spaceMark[1] = user;
                        userDoAgain = false;
                     }
                     space[1] = false;
                  }
                  else {
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            System.out.println("You may not play Space " + spacePlayed);
            userDoAgain = true;
         }
         break;
      case 3:
         if (space[2] == true) {

            spaceDes[2] = 1;

            if (spaceDes[2] == 1){
               spaceMark[2] = user;
               userDoAgain = false;
            }

            space[2] = false;
         }
         else {
            System.out.println("You may not play Space " + spacePlayed);
            userDoAgain = true;
         }
         break;
      case 4:
         if (space[3] == true) {

            spaceDes[3] = 1;

            if (spaceDes[3] == 1){
               spaceMark[3] = user;
               userDoAgain = false;
            }

            space[3] = false;
         }
         else {
            System.out.println("You may not play Space " + spacePlayed);
            userDoAgain = true;
         }
         break;
      case 5:
         if (space[4] == true) {

            spaceDes[4] = 1;

            if (spaceDes[4] == 1){
               spaceMark[4] = user;
               userDoAgain = false;
            }

            space[4] = false;
         }
         else {
            System.out.println("You may not play Space " + spacePlayed);
            userDoAgain = true;
         }
         break;
      case 6:
         if (space[5] == true) {

            spaceDes[5] = 1;

            if (spaceDes[5] == 1){
               spaceMark[5] = user;
               userDoAgain = false;
            }
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            space[5] = false;
         }
         else {
            System.out.println("You may not play Space " + spacePlayed);
            userDoAgain = true;
         }
         break;
      case 7:
         if (space[6] == true) {

            spaceDes[6] = 1;

            if (spaceDes[6] == 1){
               spaceMark[6] = user;
               userDoAgain = false;
            }

            space[6] = false;
         }
         else {
            System.out.println("You may not play Space " + spacePlayed);
            userDoAgain = true;
         }
         break;
      case 8:
         if (space[7] == true) {

            spaceDes[7] = 1;

            if (spaceDes[7] == 1){
               spaceMark[7] = user;
               userDoAgain = false;
            }

            space[7] = false;
         }
         else {
            System.out.println("You may not play Space " + spacePlayed);
            userDoAgain = true;
         }
         break;
      case 9:
         if (space[8] == true) {

            spaceDes[8] = 1;

            if (spaceDes[8] == 1){
               spaceMark[8] = user;
               userDoAgain = false;
            }

            space[8] = false;
         }
         else {
            System.out.println("You may not play Space " + spacePlayed);
            userDoAgain = true;
         }
         break;
      case 0:
         System.exit(0);
         break;
   }

  //MID-TURN: Determines if the user wins.
  //If the user wins, the below statement is executed.
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            if ((spaceDes[0] == 1) && (spaceDes[1] == 1) && (spaceDes[2] == 1) ||
                (spaceDes[3] == 1) && (spaceDes[4] == 1) && (spaceDes[5] == 1) ||
                (spaceDes[6] == 1) && (spaceDes[7] == 1) && (spaceDes[8] == 1) ||
                (spaceDes[0] == 1) && (spaceDes[3] == 1) && (spaceDes[6] == 1) ||
                (spaceDes[1] == 1) && (spaceDes[4] == 1) && (spaceDes[7] == 1) ||
                (spaceDes[2] == 1) && (spaceDes[5] == 1) && (spaceDes[8] == 1) ||
                (spaceDes[0] == 1) && (spaceDes[4] == 1) && (spaceDes[8] == 1) ||
                (spaceDes[2] == 1) && (spaceDes[4] == 1) && (spaceDes[6] == 1)){
               System.out.println("User wins!");

               //Prints the Tic-Tac-Toe board
               System.out.println("");
               System.out.println("|===========|");
               System.out.print("| " + spaceMark[0]);
               System.out.print(" | " + spaceMark[1]);
               System.out.println(" | " + spaceMark[2] + " |");
               System.out.println("|===========|");
               System.out.print("| " + spaceMark[3]);
               System.out.print(" | " + spaceMark[4]);
               System.out.println(" | " + spaceMark[5] + " | ");
               System.out.println("|===========|");
               System.out.print("| " + spaceMark[6]);
               System.out.print(" | " + spaceMark[7]);
               System.out.println(" | " + spaceMark[8] + " | ");
               System.out.println("|===========|");

               //Records the win to the TicTacToe_Record.txt file
               gameRecord.write(gameName);
               gameRecord.write(" |  Outcome: User won     | Last turn: ");
               gameRecord.write(turn + "\n");

               gameRecord.close();

               System.exit(0); //Exits the program
            }
         }

         //Random number generator for the computer
         Random computerTurn = new Random();

         //Declare compTurn of type integer
         //This determines which space the computer selects
         int compTurn;

         //Declare doAgain of type boolean
         boolean doAgain = true;

         //doAgain loop, in the event the computer selects a space that is already occupied.
         while (doAgain == true){

            //An integer between 1 and 9 is generated.
            compTurn = computerTurn.nextInt(9);
            compTurn++;

            //Switch statement that is executed based on the computer generated number
(compTurn)
            switch (compTurn) {

               //If compTurn is 1 (meaning Space 1 is selected)
               case 1:
                  if (space[0] == true) { //Space 1 is NOT occupied
                     spaceDes[0] = 2; //Space 1 is marked for the computer
                     if (spaceDes[0] == 2){
                        spaceMark[0] = computer; //Space 1 is marked X or O based opposite of
the user's input
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                        doAgain = false; //doAgain loop is terminated
                        space[0] = false; //Space becomes unplayable in future turns

                        break;
                     }
                  }
                  else { //If space is already occupied.
                     doAgain = true; //Loop is executed; computer generates random int
between 1 and 9 until it selects an unoccupied space.
                  }
                  break;

               //Comments on case 1 apply to cases 2 through 9 as well.
               case 2:
                  if (space[1] == true) {
                     spaceDes[1] = 2;
                     if (spaceDes[1] == 2){
                        spaceMark[1] = computer;
                        doAgain = false;
                        space[1] = false;

                        break;
                     }
                  }
                  else {
                     doAgain = true;
                  }
                  break;
               case 3:
                  if (space[2] == true) {
                     spaceDes[2] = 2;
                     if (spaceDes[2] == 2){
                        spaceMark[2] = computer;
                        doAgain = false;
                        space[2] = false;

                        break;
                     }
                  }
                  else {
                     doAgain = true;
                  }
                  break;
               case 4:
                  if (space[3] == true) {
                     spaceDes[3] = 2;
                     if (spaceDes[3] == 2){
                        spaceMark[3] = computer;
                        doAgain = false;
                        space[3] = false;

                        break;
                     }
                  }
                  else {
                     doAgain = true;
                  }
                  break;
               case 5:
                  if (space[4] == true) {
                     spaceDes[4] = 2;
                     if (spaceDes[4] == 2){
                        spaceMark[4] = computer;
                        doAgain = false;
                        space[4] = false;
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```
            break;
         }
      }
      else {
         doAgain = true;
      }
      break;
   case 6:
      if (space[5] == true) {
         spaceDes[5] = 2;
         if (spaceDes[5] == 2){
            spaceMark[5] = computer;
            doAgain = false;
            space[5] = false;

            break;
         }
      }
      else {
         doAgain = true;
      }
      break;
   case 7:
      if (space[6] == true) {
         spaceDes[6] = 2;
         if (spaceDes[6] == 2){
            spaceMark[6] = computer;
            doAgain = false;
            space[6] = false;

            break;
         }
      }
      else {
         doAgain = true;
      }
      break;
   case 8:
      if (space[7] == true) {
         spaceDes[7] = 2;
         if (spaceDes[7] == 2){
            spaceMark[7] = computer;
            doAgain = false;
            space[7] = false;

            break;
         }
      }
      else {
         doAgain = true;
      }
      break;
   case 9:
      if (space[8] == true) {
         spaceDes[8] = 2;
         if (spaceDes[8] == 2){
            spaceMark[8] = computer;
            doAgain = false;
            space[8] = false;

            break;
         }
      }
      else {
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                  doAgain = true;
               }
               break;
            case 0:
               System.exit(0);
               break;
         }

         //Prints which space the computer has chosen.
         System.out.print("Computer chooses space " + compTurn);

         //If else statement, based on whether or not the doAgain loop is executed
         if (doAgain == true){ //If it is executed, the below statement is added on to the
above statement
            System.out.println(", but the space was taken, so the computer chose a
different number.");
         }
         else{ //If it is not executed (meaning the computer selects an unoccupied space),
only a period . is added to the end of the above statement.
            System.out.println(".");
         }


      //Determines if the computer wins or if it's a tie.

         //Statement is executed if computer wins
         if((spaceDes[0] == 2) && (spaceDes[1] == 2) && (spaceDes[2] == 2) ||
           (spaceDes[3] == 2) && (spaceDes[4] == 2) && (spaceDes[5] == 2) ||
           (spaceDes[6] == 2) && (spaceDes[7] == 2) && (spaceDes[8] == 2) ||
           (spaceDes[0] == 2) && (spaceDes[3] == 2) && (spaceDes[6] == 2) ||
           (spaceDes[1] == 2) && (spaceDes[4] == 2) && (spaceDes[7] == 2) ||
           (spaceDes[2] == 2) && (spaceDes[5] == 2) && (spaceDes[8] == 2) ||
           (spaceDes[0] == 2) && (spaceDes[4] == 2) && (spaceDes[8] == 2) ||
           (spaceDes[2] == 2) && (spaceDes[4] == 2) && (spaceDes[6] == 2)){
            System.out.println("Computer wins!"); //Prints that the computer has won.

            //Prints Tic-Tac-Toe board, records the win then exits the program
            System.out.println("");
            System.out.println("|===========|");
            System.out.print("| " + spaceMark[0]);
            System.out.print(" | " + spaceMark[1]);
            System.out.println(" | " + spaceMark[2] + " |");
            System.out.println("|===========|");
            System.out.print("| " + spaceMark[3]);
            System.out.print(" | " + spaceMark[4]);
            System.out.println(" | " + spaceMark[5] + " | ");
            System.out.println("|===========|");
            System.out.print("| " + spaceMark[6]);
            System.out.print(" | " + spaceMark[7]);
            System.out.println(" | " + spaceMark[8] + " | ");
            System.out.println("|===========|");

            //Records the win to the TicTacToe_Record.txt file
            gameRecord.write(gameName);
            gameRecord.write(" |  Outcome: Computer won | Last turn: ");
            gameRecord.write(turn + "\n");

            gameRecord.close();

            System.exit(0);
         }
         //If a tie occurs, the system will print "Tie!", record the tie, then exit.
         else if((space[0] == false) && (space[1] == false) && (space[2] == false) &&
               (space[3] == false) && (space[4] == false) && (space[5] == false) &&
               (space[6] == false) && (space[7] == false) && (space[8] == false)){
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```
                System.out.println("Tie!");

                //Records the win to the TicTacToe_Record.txt file
                gameRecord.write(gameName);
                gameRecord.write(" |  Outcome: Tie          | Last turn: ");
                gameRecord.write(turn + "\n");

                gameRecord.close();

                System.exit(0);
            }

        }

        //If no wins or ties are detected, the program will display the Tic-Tac-Toe board,
and start the next turn.
        System.out.println("");
        System.out.println("|===========|");
        System.out.print("| " + spaceMark[0]);
        System.out.print(" | " + spaceMark[1]);
        System.out.println(" | " + spaceMark[2] + " |");
        System.out.println("|===========|");
        System.out.print("| " + spaceMark[3]);
        System.out.print(" | " + spaceMark[4]);
        System.out.println(" | " + spaceMark[5] + " | ");
        System.out.println("|===========|");
        System.out.print("| " + spaceMark[6]);
        System.out.print(" | " + spaceMark[7]);
        System.out.println(" | " + spaceMark[8] + " | ");
        System.out.println("|===========|");
    }

  }
}
```