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package com.ishank;

import java.util.ArrayList;
import java.util.List;
import java.util.Scanner;

public class Main {

    private static int[] magicSquareArray = new int[]{8,3,4,1,5,9,6,7,2};    //reference magic
square array
    private static String[] runningArray = new String[]{"_","_","_","_","_","_","_","_","_"};
//display array
    private static List<Integer> humanList = new ArrayList<>();    //list of human moves
    private static List<Integer> computerList = new ArrayList<>(); //list of computer moves

    public static void main(String[] args) {

        System.out.println("\n\nReference magic Square\n");
        printMagicSquare(magicSquareArray);    //function to print the magic square

        System.out.print("\nPress h to start human first\nPress c to start computer first\n");

        Scanner input = new Scanner(System.in);
        String choice = input.nextLine();    //input choice between human and computer from the
user

        while (!(choice.equals("c") || choice.equals("h"))){    //input the choice again in case of
wrong input
            System.out.println("please enter the correct input");
            choice = input.nextLine();
        }

        if (choice.equals("c")) Go("computer"); //start with computer if input is c
        else Go("human");    //start with human if input is h
    }

    private static void Go(String player) {    //Go method for starting the game
        for (int i=0;i<9;i++){
            if (player.equals("computer")){    //if computer starts the game
                if (i==0) {    //in first move, machine always plays in the middle
                    System.out.println("Move 1: Machine\n");
                    runningArray[4] = "x";
                    computerList.add(magicSquareArray[4]);
                    printRunningSquare(runningArray);    //printing the board
                    printLists();
                }

                else if (i%2 != 0){    //odd counts corresponds to human input
                    inputHuman(i);    //calling human input method and passing the move number
                    checkDraw();    //checks if the match is draw
                }
            }
        }
    }
}

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    }

    else if(i==2) {    //in third move, machine tries to occupy the corners first
        System.out.println("\nMove 3: Machine\n");
        GotoCorners();    //calling the corners occupying method
        printRunningSquare(runningArray);
        printLists();
    }

    else if (i>3 && (i%2==0)){    //after fifth move machine tries to check the winning
possibilities for both computer and human
        System.out.println("\nMove" + (i+1) + ": Machine\n");
        if (possWin("c")) {    //checking the winning possibility of the computer
            printRunningSquare(runningArray);
            printLists();
            System.out.println("\nMachine wins !\n");
            break;    //move out of the loop if machine wins
        }
        else if (possWin("h")){    //checking the winning possibility of the computer if
machine can't win
            printRunningSquare(runningArray);
            printLists();
            checkDraw();
        }
        else {
            GotoCorners();    //machine plays randomly if both possibilities return false
            printRunningSquare(runningArray);
            printLists();
            checkDraw();
        }
    }
}

else if (player.equals("human")){    //if human starts the game
    if(i%2 == 0){    //even counts corresponds to human input
        inputHuman(i);
        checkDraw();
    }
    else if (i==1) {
        System.out.println("Move 2: Machine\n");
        if(runningArray[0].equals("o") || runningArray[2].equals("o")) {    //if human plays in
the corners, machine will not play in the middle
            runningArray[1]="x";
            computerList.add(magicSquareArray[1]);
        }
        else if(runningArray[6].equals("o") || runningArray[8].equals("o")) {
            runningArray[7]="x";
            computerList.add(magicSquareArray[7]);
        }
        else if (runningArray[4].equals("_")) {    //else machine will play in the middle
            runningArray[4] = "x";
            computerList.add(magicSquareArray[4]);
        }
    }
}

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        else GotoCorners(); //if human has played in the middle, machine will go to
corners
        printRunningSquare(runningArray);
        printLists();
    }

    else if(i==3) { //from fourth move, machine will start checking winning possibilities
        System.out.println("\nMove 4: Machine\n");
        if(possWin("h")){
            printRunningSquare(runningArray);
            printLists();
        }

        else {
            GotoCorners();
            printRunningSquare(runningArray);
            printLists();
        }
    }

    else if (i>4 && (i%2!=0)){
        System.out.println("\nMove" + (i+1) + ": Machine\n");
        if(possWin("c")) { //winning possibility of computer
            printRunningSquare(runningArray);
            printLists();
            System.out.println("\nMachine wins !\n");
            break;
        }
        else if (possWin("h")){ //winning possibility of human
            printRunningSquare(runningArray);
            printLists();
            checkDraw();
        }
        else { //if both doesn't persist, machine will go to corners
            GotoCorners();
            printRunningSquare(runningArray);
            printLists();
            checkDraw();
        }
    }
}
}
}

private static boolean possWin(String winCheck) { //initializing boolean function possWin

    if (winCheck.equals("c")){ //winning possibility of computer
        if (computerList.size()==2){ //checking for the case when computerList contains 2
elements
            int sum = computerList.get(0)+computerList.get(1); //sum of 2 numbers in
computerList
            int diff = 15-sum;

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        if (diff<0 || diff>9) return false;
        else {
            for (int x=0; x<9; x++){
                if (magicSquareArray[x]==diff && runningArray[x].equals("_")) { //if
computer finds empty position then it will play in that position and win
                    runningArray[x] = "x";
                    computerList.add(magicSquareArray[x]);
                    return true;
                }
            }
            return false;
        }
    }
}

else if (computerList.size()==3){ //checking for the case when computerList contains 3
elements
    int[] sum = new int[]{0,0,0}; //sum array
    int[] diff = new int[]{0,0,0}; //difference array

    sum[0] = computerList.get(0)+computerList.get(1);
    sum[1] = computerList.get(1)+computerList.get(2);
    sum[2] = computerList.get(2)+computerList.get(0);

    for (int i=0; i<3; i++){ //first loop compute difference array
        diff[i] = 15-sum[i];
        for (int x=0; x<9; x++){ //second loop will check the winning possibilities
            if (magicSquareArray[x]==diff[i] && runningArray[x].equals("_")) {
                runningArray[x] = "x";
                computerList.add(magicSquareArray[x]);
                return true;
            }
        }
    }
    return false;
}

else if (computerList.size()==4){ //checking for the case when computerList contains 4
elements
    int[] sum = new int[]{0,0,0,0,0,0}; //sum array
    int[] diff = new int[]{0,0,0,0,0,0}; //difference array

    sum[0] = computerList.get(0)+computerList.get(1);
    sum[1] = computerList.get(1)+computerList.get(2);
    sum[2] = computerList.get(2)+computerList.get(3);
    sum[3] = computerList.get(0)+computerList.get(2);
    sum[4] = computerList.get(0)+computerList.get(3);
    sum[5] = computerList.get(1)+computerList.get(3);

    for (int i=0; i<6; i++){ //first loop compute difference array
        diff[i] = 15-sum[i];
        for (int x=0; x<9; x++){ //second loop will check the winning possibilities
            if (magicSquareArray[x]==diff[i] && runningArray[x].equals("_")) {
                runningArray[x] = "x";

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        computerList.add(magicSquareArray[x]);
        return true;
    }
}
}
return false;
}
}
else if (winCheck.equals("h")){    //winning possibility of human

    if (humanList.size()==2){
        int sumHuman = humanList.get(0)+humanList.get(1);
        int diffHuman = 15-sumHuman;

        if (runningArray[5].equals("o") && runningArray[7].equals("o")) {    //IMPORTANT
exception case
            runningArray[8] = "x";
            computerList.add(magicSquareArray[8]);
            return true;
        }
        else if (diffHuman<0 || diffHuman>9) return false;

        else {    //blocking the winning possibility of human
            for (int x=0; x<9; x++){
                if (magicSquareArray[x]==diffHuman && runningArray[x].equals("_")) {
                    runningArray[x] = "x";
                    computerList.add(magicSquareArray[x]);
                    return true;
                }
            }
            return false;
        }
    }
}
else if (humanList.size()==3){    //checking for the case when humanList contains 3
elements
    int[] sum = new int[]{0,0,0};
    int[] diff = new int[]{0,0,0};

    sum[0] = humanList.get(0)+humanList.get(1);
    sum[1] = humanList.get(1)+humanList.get(2);
    sum[2] = humanList.get(2)+humanList.get(0);

    for (int i=0; i<3; i++){
        diff[i] = 15-sum[i];
        for (int x=0; x<9; x++){
            if (magicSquareArray[x]==diff[i] && runningArray[x].equals("_")) {
                runningArray[x] = "x";
                computerList.add(magicSquareArray[x]);
                return true;
            }
        }
    }
}

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    }
    return false;
}
else if (humanList.size()==4){    //checking for the case when humanList contains 4
elements
    int[] sum = new int[]{0,0,0,0,0,0};
    int[] diff = new int[]{0,0,0,0,0,0};

    sum[0] = humanList.get(0)+humanList.get(1);
    sum[1] = humanList.get(1)+humanList.get(2);
    sum[2] = humanList.get(2)+humanList.get(3);
    sum[3] = humanList.get(0)+humanList.get(2);
    sum[4] = humanList.get(0)+humanList.get(3);
    sum[5] = humanList.get(1)+humanList.get(3);

    for (int i=0; i<6; i++){
        diff[i] = 15-sum[i];
        for (int x=0; x<9; x++){
            if (magicSquareArray[x]==diff[i] && runningArray[x].equals("_")) {
                runningArray[x] = "x";
                computerList.add(magicSquareArray[x]);
                return true;
            }
        }
    }
    return false;
}
return false;
}

private static void inputHuman(int i) {    //method declaration for human input
    System.out.println("\nMove " + (i+1) + ": Human, Input index from 1 to 9\n");
    Scanner input = new Scanner(System.in);
    int humanInput = input.nextInt();

    while (humanInput<1 || humanInput>9){    //human input should be between 1 to 9
        System.out.println("please enter the correct input");
        humanInput = input.nextInt();
    }

    while (!runningArray[humanInput-1].equals("_")){    //human input should not override
an already taken input
        System.out.println("Input already taken, please try again");
        humanInput = input.nextInt();
    }

    runningArray[humanInput-1] = "o";
    printRunningSquare(runningArray);
    humanList.add(magicSquareArray[humanInput-1]);    //adding elements of humanInput to
humanList
    printLists();

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}

private static void GotoCorners() {    //GotoCorners method call
    if (runningArray[0].equals("_")) { //will try to occupy corners first, then the centres
        runningArray[0] = "x";
        computerList.add(magicSquareArray[0]);
    }
    else if (runningArray[2].equals("_")) {
        runningArray[2] = "x";
        computerList.add(magicSquareArray[2]);
    }
    else if (runningArray[6].equals("_")) {
        runningArray[6] = "x";
        computerList.add(magicSquareArray[6]);
    }
    else if (runningArray[8].equals("_")) {
        runningArray[8] = "x";
        computerList.add(magicSquareArray[8]);
    }
    else if (runningArray[1].equals("_")) {
        runningArray[1] = "x";
        computerList.add(magicSquareArray[1]);
    }
    else if (runningArray[3].equals("_")) {
        runningArray[3] = "x";
        computerList.add(magicSquareArray[3]);
    }
    else if (runningArray[5].equals("_")) {
        runningArray[5] = "x";
        computerList.add(magicSquareArray[5]);
    }
    else if (runningArray[7].equals("_")) {
        runningArray[7] = "x";
        computerList.add(magicSquareArray[7]);
    }
}

private static void printRunningSquare(String[] array) {    //prints the tic tac toe square board
    for (int i=0;i<array.length; i++){
        if ((i+1)%3 == 0) System.out.print(array[i] + " \n");
        else System.out.print(array[i] + " ");
    }
}

private static void printMagicSquare(int[] array) {    //prints the magicSquareArray
    for (int i=0;i<array.length; i++){
        if ((i+1)%3 == 0) System.out.print(array[i] + " \n");
        else System.out.print(array[i] + " ");
    }
}

private static void printLists() {    //prints the list of human and computer

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System.out.println("\n" + "computer list : " + computerList);
System.out.println("human list : " + humanList + "\n");
}

private static void checkDraw() {
    int count = 0;
    for (int i=0; i<9; i++){
        if (!runningArray[i].equals("_")) ++count;
    }
    if (count==9) System.out.println("\nMatch Draw !\n");
}
}
```