School of Mechanical & Manufacturing Engineering (SMME),

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Course Title: Fundamentals of Programming (CS-109)

Lab Project

"Tic-Tac-Toe Game"

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Lab Project

Tic-Tac-Toe

Introduction:

The given code represents a C++ program that introduces a text-based implementation of the Tic-Tac-Toe game. This game involves a human player, marked as 'X,' competing against a computer opponent, marked as 'O,' on a 3x3 grid.

The application uses a nested loop structure to handle user input, initialize the grid, and execute the main game logic, among other game management tasks. This methodical technique guarantees a systematic game flow and gives the player a fun, engaging experience.

Explanation of code:

1. The initial step of the program involves the creation of a 3x3 character array named **'arr,'** which serves as the representation of grid. This array is pre-filled with empty spaces ( ) to establish the initial state of the game board.

2. The condition on random command to always remain in the boundary we used condition on it as

   ace= (rand () %9) +1

3. The flow of the game is governed by a game loop, where the variable named **'again'** controls whether the player chooses to start another round after completing a game.

4. Within the game loop, the player and the computer engage in alternating turns to make their moves. The player specifies the position to place their 'X,' while the computer generates a random move to position an 'O' on the grid.

5. The iteration of the game continues to work until a conclusive outcome is reached, either a clear winner or a tied match. The determination of a winner involves scrutinizing the grid for three consecutives **(X or O)** in either a row, column, or diagonal configuration.

6. Throughout the game, the program regularly displays the current state of the game board following each move. Once the game concludes, it reports the victory or declares a tie, ensuring the player is informed of the outcome.

C++ file:

tic.cpp

Code:

```
#include<bits/stdc++.h>
using namespace std;
int main()
{
	int y;
	int ace=1;
	cout<<"Hello. \n";
	cout<<"Welcome to nightmare tic tac toe. \n";
	cout<<"You are player and playing with computer.  \n";
	cout<<"| 1 | 2 | 3 |  \n";
	cout<<"|___|___|___| \n";
	cout<<"| 4 | 5 | 6 |  \n";
	cout<<"|___|___|___| \n";
	cout<<"| 7 | 8 | 9 |  \n";
	cout<<"|___|___|___| \n";
	cout<<"Press the number where you want to place 'X' ";
	char again='y';
	while (again=='y')
	{
		char arr[3][3]={};
	char n=' ';
		for (int i=0;i<3;i++)
		{
			for(int j=0;j<3;j++){
				arr[i][j]=n;

			}
		}
		cout<<endl;


		//Player turn
		char place;
		for (int j=0;j<100;j++)
		{
```

```
		cout<<"Enter your choice = ";
		cin>>place;
		if(place=='1'&&arr[0][0]==' '){
			arr[0][0]='X';
		}
		else if(place=='2'&&arr[0][1]==' '){
			arr[0][1]='X';
		}
		else if(place=='3'&&arr[0][2]==' '){
			arr[0][2]='X';
		}
		else if(place=='4'&&arr[1][0]==' '){
			arr[1][0]='X';
		}
		else if(place=='5'&&arr[1][1]==' '){
			arr[1][1]='X';
		}
		else if(place=='6'&&arr[1][2]==' '){
			arr[1][2]='X';
		}
		else if(place=='7'&&arr[2][0]==' '){
			arr[2][0]='X';
		}
		else if(place=='8'&&arr[2][1]==' '){
			arr[2][1]='X';
		}
		else if(place=='9'&&arr[2][2]==' '){
			arr[2][2]='X';
		}
		else
		{
			cout<<" Invalid or place already taken. \n";
			continue;
		}

	//Computer turn

		if (arr[0][0] ==arr[0][1] && arr[0][1]=='X'&&arr[0][2]==' '){
		arr[0][2]='O';
		}
		else if(arr[0][1] ==arr[0][2] && arr[0][2]=='X'&&arr[0][0]==' '){
			arr[0][0]='O';
		}
		else if(arr[0][0] ==arr[0][2] && arr[0][2]=='X'&&arr[0][1]==' '){
			arr[0][1]='O';
		}
		else if (arr[1][0] == arr[1][1] && arr[1][1]=='X'&&arr[1][2]==' '){
		arr[1][2]='O';
		}
		else if(arr[1][1] ==arr[1][2] && arr[1][2]=='X'&&arr[1][0]==' '){
			arr[1][0]='O';
		}
		else if(arr[1][0] ==arr[1][2]&&arr[1][2]=='X'&&arr[1][1]==' '){
			arr[1][1]='O';
		}
```

```
        else if (arr[2][0] == arr[2][1] && arr[2][1]=='X'&&arr[2][2]==' '){
arr[2][2]='O';
        }
        else if(arr[2][1] ==arr[2][2] && arr[2][2]=='X'&&arr[2][0]==' '){
                arr[2][0]='O';
        }
        else if(arr[2][0] == arr[2][2] && arr[2][2]=='X'&&arr[2][1]==' '){
                arr[2][1]='O';
        }
        else if (arr[0][0] == arr[1][0] && arr[1][0]=='X'&&arr[2][0]==' '){
        arr[2][0]='O';
        }
        else if(arr[0][0] == arr[2][0] && arr[2][0]=='X'&&arr[1][0]==' '){
                arr[1][0]='O';
        }
        else if(arr[1][0] == arr[2][0] && arr[2][0]=='X'&&arr[0][0]==' '){
                arr[0][0]='O';
        }
        else if (arr[0][1] ==arr[1][1] && arr[1][1]=='X'&&arr[2][1]==' '){
        arr[2][1]='O';
        }
        else if(arr[0][1] == arr[2][1] && arr[2][1]=='X'&&arr[1][1]==' '){
                arr[1][1]='O';
        }
        else if(arr[2][1] == arr[1][1] && arr[1][1]=='X'&&arr[0][1]==' '){
                arr[0][1]='O';
        }
        else if (arr[0][2] == arr[1][2] && arr[1][2]=='X'&&arr[2][2]==' '){
        arr[2][2]='O';
        }
        else if(arr[1][2] ==arr[2][2] && arr[2][2]=='X'&&arr[0][2]==' '){
                arr[0][2]='O';
        }
        else if(arr[0][2] == arr[2][2] && arr[2][2]=='X'&&arr[1][2]==' '){
                arr[1][2]='O';
        }
        else if (arr[0][0] == arr[1][1] && arr[1][1]=='X'&&arr[2][2]==' '){
        arr[2][2]='O';
        }
        else if(arr[0][0] ==arr[2][2] && arr[2][2]=='X'&&arr[1][1]==' '){
                arr[1][1]='O';
        }
        else if(arr[1][1] == arr[2][2] && arr[2][2]=='X'&&arr[0][0]==' '){
                arr[0][0]='O';
        }
        else if (arr[0][2] == arr[1][1] && arr[1][1]=='X'&&arr[2][0]==' '){
        arr[2][0]='O';
        }
        else if(arr[1][1] == arr[2][0] && arr[2][0]=='X'&&arr[0][2]==' '){
                arr[0][2]='O';
        }
        else if(arr[0][2] == arr[2][0] && arr[2][0]=='X'&&arr[1][1]==' '){
                arr[1][1]='O';
        }
        else
```

```
{
                    for(int u=0;u<100;u++)
                    {
                        ace=(rand()%9)+1;
                        if(place==1&&arr[0][0]==' ')
                        {
                            arr[0][0]='O';
                            break;
                        }
                    else if(ace==2&&arr[0][1]==' '){
                        arr[0][1]='O';
                        break;
                        }
                    else if(ace==3&&arr[0][2]==' '){
                        arr[0][2]='O';
                        break;
                    }
                    else if(ace==4&&arr[1][0]==' '){
                        arr[1][0]='O';
                        break;
                    }
                    else if(ace==5&&arr[1][1]==' '){
                        arr[1][1]='O';
                        break;
                    }
                    else if(ace==6&&arr[1][2]==' '){
                        arr[1][2]='O';
                        break;
                    }
                    else if(ace==7&&arr[2][0]==' '){
                        arr[2][0]='O';
                        break;
                    }
                    else if(ace==8&&arr[2][1]==' '){
                        arr[2][1]='O';
                        break;
                    }
                    else if(ace==9&&arr[2][2]==' '){
                        arr[2][2]='O';
                        break;
                    }
            else{
                    continue;
            }
                }

            }

for (int z=0;z<3;z++)
                {
                    for(int k=0;k<3;k++)
                    {
                        cout<<"| "<<arr[z][k];
                        if(k==2)
                        {
```

```
                                        cout<<"|";
                                }

                                }
                                cout<<endl;
                                cout<<"|__|__|__|"<<endl;
                        }

                        //To check who wins or tie
                        if ((arr[0][0] == arr[0][1] && arr[0][1] == arr[0][2] && arr[0][0] == 'X') ||
        (arr[1][0] == arr[1][1] && arr[1][1] == arr[1][2] && arr[1][0] == 'X') ||
                (arr[2][0] == arr[2][1] && arr[2][1] == arr[2][2] && arr[2][0] == 'X') ||
            (arr[0][0] == arr[1][0] && arr[1][0] == arr[2][0] && arr[0][0] == 'X') ||
            (arr[0][1] == arr[1][1] && arr[1][1] == arr[2][1] && arr[0][1] == 'X') ||
            (arr[0][2] == arr[1][2] && arr[1][2] == arr[2][2] && arr[0][2] == 'X') ||
        (arr[0][0] == arr[1][1] && arr[1][1] == arr[2][2] && arr[0][0] == 'X') ||
                (arr[0][2] == arr[1][1] && arr[1][1] == arr[2][0] && arr[0][2] == 'X'))
                                {
                                        cout << "Player wins !" << endl;
                        break;
                                }

                        else if ((arr[0][0] == arr[0][1] && arr[0][1] == arr[0][2] && arr[0][0] == 'O') ||
                (arr[1][0] == arr[1][1] && arr[1][1] == arr[1][2] && arr[1][0] == 'O') ||
            (arr[2][0] == arr[2][1] && arr[2][1] == arr[2][2] && arr[2][0] == 'O') ||
                (arr[0][0] == arr[1][0] && arr[1][0] == arr[2][0] && arr[0][0] == 'O') ||
            (arr[0][1] == arr[1][1] && arr[1][1] == arr[2][1] && arr[0][1] == 'O') ||
        (arr[0][2] == arr[1][2] && arr[1][2] == arr[2][2] && arr[0][2] == 'O') ||
                (arr[0][0] == arr[1][1] && arr[1][1] == arr[2][2] && arr[0][0] == 'O') ||
            (arr[0][2] == arr[1][1] && arr[1][1] == arr[2][0] && arr[0][2] == 'O'))
                                {
                                cout << "computer wins !" << endl;
            break;
                        }
                        else
if((arr[0][0]=='X'||arr[0][0]=='O')&&(arr[0][1]=='X'||arr[0][1]=='O')&&(arr[0][2]=='X'||arr[0][2]=='O')&&

(arr[1][0]=='X'||arr[1][0]=='O')&&(arr[1][1]=='X'||arr[1][1]=='O')&&(arr[1][2]=='X'||arr[1][2]=='O')&&

    (arr[2][0]=='X'||arr[2][0]=='O')&&(arr[2][1]=='X'||arr[2][1]=='O')&&(arr[2][2]=='X'||arr[2][2]=='O'))
                                {
                                        cout<<"Its a tie. "<<endl;
                                        break;
                                }

    }

            cout<<"Would You like to play it again. pres 'y' for yes or 'n' for no and press enter ";
            cin>>again;
    }

    return 0;

}
```

```cpp
#include<bits/stdc++.h>
using namespace std;
int main()
{
    int y;
    int ace=1;
    cout<<"Hello. \n";
    cout<<"Welcome to nightmare tic tac toe. \n";
    cout<<"You are player and playing with computer.  \n";
    cout<<"| 1 | 2 | 3 |  \n";
    cout<<"|___|___|___| \n";
    cout<<"| 4 | 5 | 6 |  \n";
    cout<<"|___|___|___| \n";
    cout<<"| 7 | 8 | 9 |  \n";
    cout<<"|___|___|___| \n";
    cout<<"Press the number where you want to place 'X' ";
    char again='y';
    while (again=='y')
    {
        char arr[3][3]={};
        char n=' ';
        for (int i=0;i<3;i++)
        {
            for(int j=0;j<3;j++){
                arr[i][j]=n;

            }
        }
        cout<<endl;


        //Player turn
        char place;
        for (int j=0;j<100;j++)
        {
            cout<<"Enter your choice = ";
            cin>>place;
            if(place=='1'&&arr[0][0]==' '){
                arr[0][0]='X';
            }
            else if(place=='2'&&arr[0][1]==' '){
                arr[0][1]='X';
            }
            else if(place=='3'&&arr[0][2]==' '){
                arr[0][2]='X';
            }
            else if(place=='4'&&arr[1][0]==' '){
                arr[1][0]='X';
            }
            else if(place=='5'&&arr[1][1]==' '){
                arr[1][1]='X';
            }
            else if(place=='6'&&arr[1][2]==' '){
                arr[1][2]='X';
            }
            else if(place=='7'&&arr[2][0]==' '){
                arr[2][0]='X';
            }
            else if(place=='8'&&arr[2][1]==' '){
                arr[2][1]='X';
            }
            else if(place=='9'&&arr[2][2]==' '){
                arr[2][2]='X';
            }
            else
            {
                cout<<" Invalid or place already taken. \n";
                continue;
            }

            //Computer turn

            if (arr[0][0] ==arr[0][1] && arr[0][1]=='X'&&arr[0][2]==' '){
```

```
            arr[0][2]='O';
        }
        else if(arr[0][1] ==arr[0][2] && arr[0][2]=='X'&&arr[0][0]==' '){
            arr[0][0]='O';
        }
        else if(arr[0][0] ==arr[0][2] && arr[0][2]=='X'&&arr[0][1]==' '){
            arr[0][1]='O';
        }
        else if (arr[1][0] == arr[1][1] && arr[1][1]=='X'&&arr[1][2]==' '){
            arr[1][2]='O';
        }
        else if(arr[1][1] ==arr[1][2] && arr[1][2]=='X'&&arr[1][0]==' '){
            arr[1][0]='O';
        }
        else if(arr[1][0] ==arr[1][2]&&arr[1][2]=='X'&&arr[1][1]==' '){
            arr[1][1]='O';
        }
        else if (arr[2][0] == arr[2][1] && arr[2][1]=='X'&&arr[2][2]==' '){
          arr[2][2]='O';
        }
        else if(arr[2][1] ==arr[2][2] && arr[2][2]=='X'&&arr[2][0]==' '){
            arr[2][0]='O';
        }
        else if(arr[2][0] == arr[2][2] && arr[2][2]=='X'&&arr[2][1]==' '){
            arr[2][1]='O';
        }
        else if (arr[0][0] == arr[1][0] && arr[1][0]=='X'&&arr[2][0]==' '){
            arr[2][0]='O';
        }
        else if(arr[0][0] == arr[2][0] && arr[2][0]=='X'&&arr[1][0]==' '){
            arr[1][0]='O';
        }
        else if(arr[1][0] == arr[2][0] && arr[2][0]=='X'&&arr[0][0]==' '){
            arr[0][0]='O';
        }
        else if (arr[0][1] ==arr[1][1] && arr[1][1]=='X'&&arr[2][1]==' '){
            arr[2][1]='O';
        }
        else if(arr[0][1] == arr[2][1] && arr[2][1]=='X'&&arr[1][1]==' '){
            arr[1][1]='O';
        }
        else if(arr[2][1] == arr[1][1] && arr[1][1]=='X'&&arr[0][1]==' '){
            arr[0][1]='O';
        }
        else if (arr[0][2] == arr[1][2] && arr[1][2]=='X'&&arr[2][2]==' '){
            arr[2][2]='O';
        }
        else if(arr[1][2] ==arr[2][2] && arr[2][2]=='X'&&arr[0][2]==' '){
            arr[0][2]='O';
        }
        else if(arr[0][2] == arr[2][2] && arr[2][2]=='X'&&arr[1][2]==' '){
            arr[1][2]='O';
        }
        else if (arr[0][0] == arr[1][1] && arr[1][1]=='X'&&arr[2][2]==' '){
            arr[2][2]='O';
        }
        else if(arr[0][0] ==arr[2][2] && arr[2][2]=='X'&&arr[1][1]==' '){
            arr[1][1]='O';
        }
        else if(arr[1][1] == arr[2][2] && arr[2][2]=='X'&&arr[0][0]==' '){
            arr[0][0]='O';
        }
        else if (arr[0][2] == arr[1][1] && arr[1][1]=='X'&&arr[2][0]==' '){
            arr[2][0]='O';
        }
        else if(arr[1][1] == arr[2][0] && arr[2][0]=='X'&&arr[0][2]==' '){
            arr[0][2]='O';
        }
        else if(arr[0][2] == arr[2][0] && arr[2][0]=='X'&&arr[1][1]==' '){
            arr[1][1]='O';
        }
        else
        {
            for(int u=0;u<100;u++)
            {
```

```
                ace=(rand()%9)+1;
                if(place==1&&arr[0][0]==' ')
                {
                    arr[0][0]='O';
                    break;
                }
                else if(ace==2&&arr[0][1]==' '){
                    arr[0][1]='O';
                    break;
                }
                else if(ace==3&&arr[0][2]==' '){
                    arr[0][2]='O';
                    break;
                }
                else if(ace==4&&arr[1][0]==' '){
                    arr[1][0]='O';
                    break;
                }
                else if(ace==5&&arr[1][1]==' '){
                    arr[1][1]='O';
                    break;
                }
                else if(ace==6&&arr[1][2]==' '){
                    arr[1][2]='O';
                    break;
                }
                else if(ace==7&&arr[2][0]==' '){
                    arr[2][0]='O';
                    break;
                }
                else if(ace==8&&arr[2][1]==' '){
                    arr[2][1]='O';
                    break;
                }
                else if(ace==9&&arr[2][2]==' '){
                    arr[2][2]='O';
                    break;
                }
                else{
                    continue;
                }
            }

        }

        for (int z=0;z<3;z++)
        {
            for(int k=0;k<3;k++)
            {
                cout<<"| "<<arr[z][k];
                if(k==2)
                {
                    cout<<"|";
                }

            }
            cout<<endl;
            cout<<"|__|__|__|"<<endl;
        }

        //To check who wins or tie
        if ((arr[0][0] == arr[0][1] && arr[0][1] == arr[0][2] && arr[0][0] == 'X') ||
            (arr[1][0] == arr[1][1] && arr[1][1] == arr[1][2] && arr[1][0] == 'X') ||
            (arr[2][0] == arr[2][1] && arr[2][1] == arr[2][2] && arr[2][0] == 'X') ||
            (arr[0][0] == arr[1][0] && arr[1][0] == arr[2][0] && arr[0][0] == 'X') ||
            (arr[0][1] == arr[1][1] && arr[1][1] == arr[2][1] && arr[0][1] == 'X') ||
            (arr[0][2] == arr[1][2] && arr[1][2] == arr[2][2] && arr[0][2] == 'X') ||
            (arr[0][0] == arr[1][1] && arr[1][1] == arr[2][2] && arr[0][0] == 'X') ||
            (arr[0][2] == arr[1][1] && arr[1][1] == arr[2][0] && arr[0][2] == 'X'))
            {
                cout << "Player wins !" << endl;
                break;
            }

```

```
            else if ((arr[0][0] == arr[0][1] && arr[0][1] == arr[0][2] && arr[0][0] == 'O') ||
                (arr[1][0] == arr[1][1] && arr[1][1] == arr[1][2] && arr[1][0] == 'O') ||
                (arr[2][0] == arr[2][1] && arr[2][1] == arr[2][2] && arr[2][0] == 'O') ||
                (arr[0][0] == arr[1][0] && arr[1][0] == arr[2][0] && arr[0][0] == 'O') ||
                (arr[0][1] == arr[1][1] && arr[1][1] == arr[2][1] && arr[0][1] == 'O') ||
                (arr[0][2] == arr[1][2] && arr[1][2] == arr[2][2] && arr[0][2] == 'O') ||
                (arr[0][0] == arr[1][1] && arr[1][1] == arr[2][2] && arr[0][0] == 'O') ||
                (arr[0][2] == arr[1][1] && arr[1][1] == arr[2][0] && arr[0][2] == 'O'))
                {
                cout << "computer wins !" << endl;
                break;
                }
            else if((arr[0][0]=='X'||arr[0][0]=='O')&&(arr[0][1]=='X'||arr[0][1]=='O')&&(arr[0][2]=='X'||arr[0][2]=='O')&&
                (arr[1][0]=='X'||arr[1][0]=='O')&&(arr[1][1]=='X'||arr[1][1]=='O')&&(arr[1][2]=='X'||arr[1][2]=='O')&&
                (arr[2][0]=='X'||arr[2][0]=='O')&&(arr[2][1]=='X'||arr[2][1]=='O')&&(arr[2][2]=='X'||arr[2][2]=='O'))
                {
                    cout<<"Its a tie. "<<endl;
                    break;
                }

        }

        cout<<"Would You like to play it again. pres 'y' for yes or 'n' for no and press enter ";
        cin>>again;
    }

    return 0;

}
```

Output:

```
Hello.
Welcome to nightmare tic tac toe.
You are player and playing with computer.
| 1 | 2 | 3 |
|___|___|___|
| 4 | 5 | 6 |
|___|___|___|
| 7 | 8 | 9 |
|___|___|___|
Press the number where you want to place 'X'
Enter your choice = 5
|   |   |   |
|___|___|___|
|   | X | O |
|___|___|___|
|   |   |   |
|___|___|___|
Enter your choice = 1
| X |   |   |
|___|___|___|
|   | X | O |
|___|___|___|
|   |   | O |
|___|___|___|
Enter your choice = 3
| X | O | X |
|___|___|___|
|   | X | O |
|___|___|___|
|   |   | O |
|___|___|___|
Enter your choice = 7
| X | O | X |
|___|___|___|
| O | X | O |
|___|___|___|
| X |   | O |
|___|___|___|
Player wins !
Would You like to play it again. pres 'y' for yes or 'n' for no and press enter n
```

Explanation of Output:

1. A comprehensive display of the game board is presented, revealing the positions of both 'X' and 'O' symbols. This continuous update ensures that players have a detailed visual representation of the evolving state of the game.

2. Every game end with a brief and educational message from the program that makes it apparent who wins (the player, the machine, or a tie) if the game ends in a tie. Players can fully understand the results of their strategic decisions and plays during the game thanks to this extensive feedback.

Conclusion:

The provided C++ code lays the groundwork for a simple game with basic player-computer interaction. While the current version works as intended, there's room for improvement to elevate it into a more engaging and feature-rich gaming experience. This code not only offers a playable game but also serves as a steppingstone for individuals to explore the realms of game development and gain insights into basic artificial intelligence concepts.

Its simplicity makes it an excellent starting point for those interested in grasping the fundamental principles of both game creation and the integration of basic AI. By enhancing this code, developers can dive into more advanced concepts, turning a straightforward game into a platform for learning and experimentation. Whether you're a beginner or looking to build on existing knowledge, this code provides a solid foundation for an educational and enjoyable coding journey in the world of game development and artificial intelligence.