# **C Programming Language**

(6<sup>th</sup> class)

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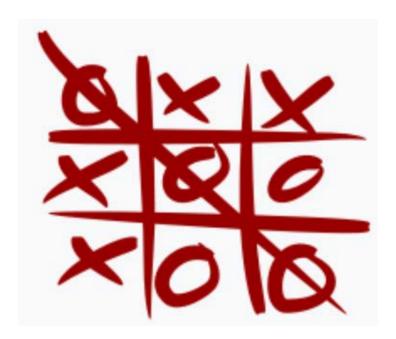
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# Today ...

- Let's practice programing!
  - Tic-Tac-Toe

## Tic-tac-toe

■ **Tic-tac-toe** (also known as noughts and crosses or Xs and Os) is a <u>paper-and-pencil game</u> for two players, X and O, who take turns marking the spaces in a 3×3 grid. The player who succeeds in placing three of their marks in a horizontal, vertical, or diagonal row wins the game.



## What should we do first?

#### Try to design a program

- Initialize (maybe setting up the table, prepare markers)
- Get user info (simple)
- Display table
- Aha... we may need a loop for each player's turn.
  - Take user input (how to take user inputs and store them)
  - Update the table and display it (simple)
  - Check condition (should we continue or end?)
  - Change players

• ..

## **Initialization**

- We have a 3 by 3 sized table.
  - What can you use to represent/store the table?

## **Initialization**

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  - Array? 2-dimensional?
  - Array (char table[3][3]) could represent the status of the table.

```
char table[3][3] = {{'_', '_', '_'}, {'_', '_', '_'}, {'_', '_', '_'}};
```

Please check whether you can see 3x3 table on the screen (print out table)

## **Initialization**

#### ■ We have a 3 by 3 sized table.

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#### Markers for two player

char markers[2] = {'o', 'x'};

## **Get User Info**

- Get the player's name
  - You may already know how to get it
  - Print a string and get the user input by using scanf

## **Get User Info**

#### ■ Get the player's name

- You may already know how to get it
- Print a string and get the user input by using scanf

```
char p[2][20];
printf("\n Enter the name of Player 0:");
scanf("%s", p[0]);
printf("\n Enter the name of Player 1:");
scanf("%s", p[1]);
```

# Display the table

■ How to print 3 by 3 sized array?

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  - Yeah, that's it. For loop

```
int i, j;
for (i=0; i<3; ++i) {
   for (j=0; j<3; ++j){
     printf("%c ", table[i][j]);
   }
   printf("\n"); /* to separate each row */
}</pre>
```

# Loop

- do while?
- while (1) ?
- whatever you want

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```
if (turn == 0){
    printf("P0's turn. Input location (row, col) : ");
}else{
    printf("P1's turn. Input location (row, col) : ");
}
scanf ("%d %d", &row, &col);
```

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  - Print a message and get the user input by using scanf

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```

- 'turn' indicates which player is now playing
  - 0 if player 0 is playing, 1 otherwise.

## Update the table and display it

#### **■** Update?

Set the table element of the position that a player specified.

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#### Update?

Set the table element of the position that a player specified

#### Display it?

- The same for loop.
- We'd better make a display module as a function

## **Check condition**

- We need to check each row, column, and diagonal.
- How?
  - We can compare characters

```
char m;
int done = 0;
int cnt = 0, i, j;
/* check each row */
for (i=0, i<3; ++i){
  m = table[i][0];
  if(done == 1)
    break;
  for (j=0; j<3; j++){
    if(m == table[i][j]){
       ++cnt;
    if(cnt == 3){
      done = 1;
    if(j == 3){
      cnt = 0;
```

## **Check condition**

- We need to check each row, column, and diagonal.
- How?
  - We can compare characters

```
char m;
int done = 0;
int cnt = 0, i, j;
/* check each row */
for (i=0, i<3; ++i){
                               Complicate!
  m = table[i][0];
  if(done == 1)
    break;
  for (j=0; j<3; j++){
    if(m == table[i][j]){
      ++cnt;
    if(cnt == 3){
     done = 1;
    if(j == 3){
      cnt = 0;
```

■ We need to check each row, column, and diagonal.

#### ■ How?

We can check the terminating conditions using numbers assigned to each character

```
int made[2] = {3*'o', 3*'x'};

/* check each row */
for (i = 0; i<3; ++i){
    sum = 0;
    for (j = 0; j<3; ++j){
        if(table[i][j] == '_')
            break;
        sum += table[i][j];
    }
    if (sum == made[0] or sum == made[1])
        done = 1;
    if (done)
        break;
}</pre>
```

# **Change players**

By changing the value of 'turn'

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```
++ turn;
turn = turn % 2;
```

### **Need more**

 Check occupation (what if a player tries to set its mark in the position that has been already occupied)

■ Error handling (what if players give the position indices which are not valid in the table (e.g., 1, 3 3, x 1))

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# Qand A

