

# Chinese Chess Leo Smart Contract Design

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## Introduction to Chinese Chess

Chinese is a two-player Chinese board game in the same family as Western chess, The present-day form of Xiangqi originated in China and is therefore commonly called Chinese chess in English.

Chinese chess has a long history. The earliest literary reference comes from the 9th century. Now is one of the most popular board games in the world.

## Project Design

### Describe the Chessboard

We use (int) value to describe the position of the chessboard , the specific design is as follows

Number **57** means row **6** column **3**

2

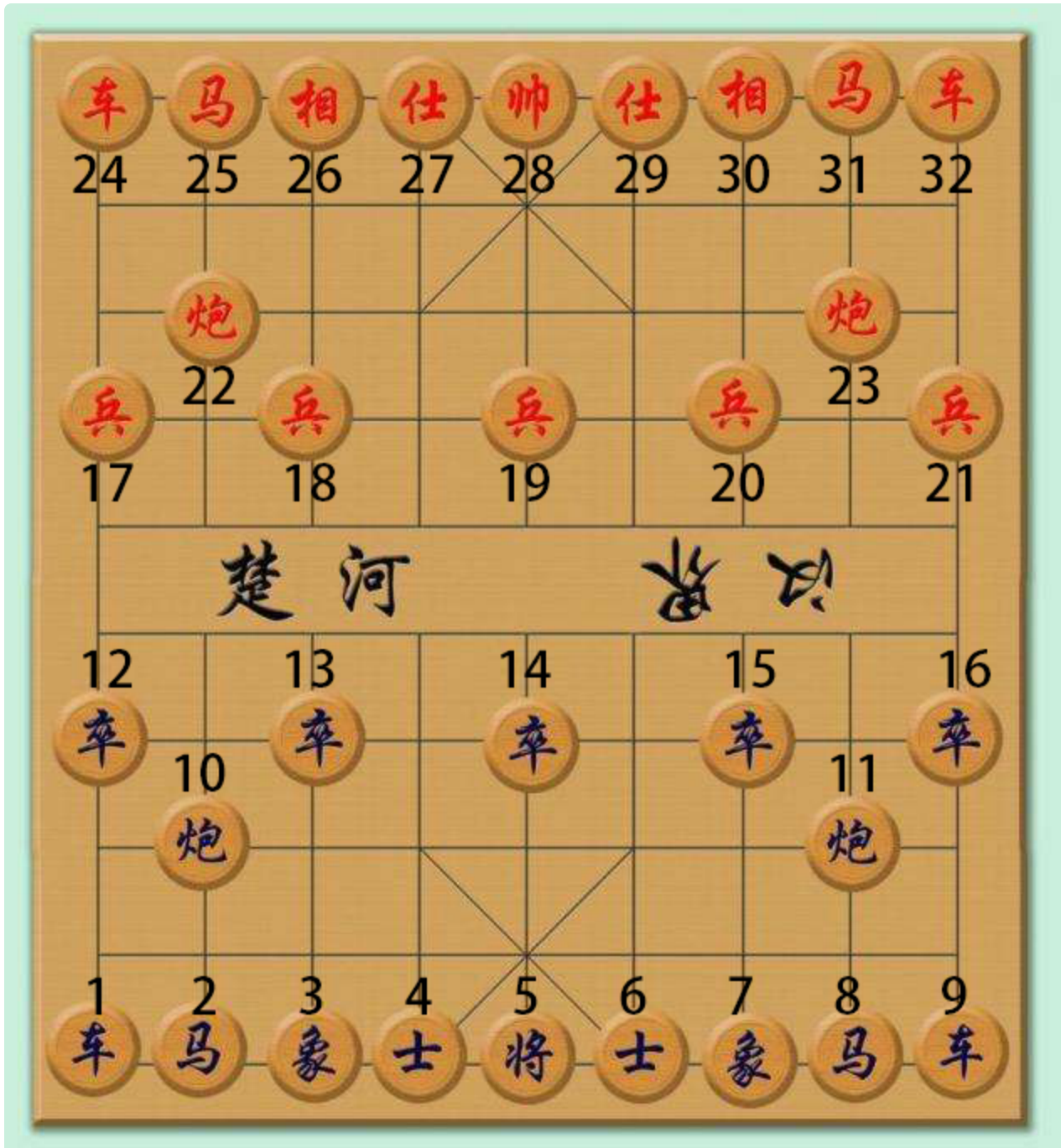
## Describe the chess piece

We use int value to describe the chess piece.

1–16 to describe the black chess

17–32 to describe the red chess

the specific design is as follows



We can use a array to describe all of the chess position, the piece number is the array index, and the value is piece's position number. So the chess status can be describe as

**Black Piece:** [00, 01, 02, 03, 04, 05, 06, 07, 08, 19, 25, 27, 29, 31, 33, 35]

**Red Piece:** [54, 56, 58, 60, 62, 64, 70, 81, 82, 83, 84, 85, 86, 87, 88, 89]

If we move the number 5 black Jiang to the position 13, then the status change to

**New Black Piece:** [00, 01, 02, 03, **13**, 05, 06, 07, 08, 19, 25, 27, 29, 31, 33, 35]

## Use u64 to describe statue

We connect the 8 index of array to a big in u64. In order the Leo can record this status.

Black Status 1 : 0001020304050607

Black Status 2 : 0819252729313335

Red Status 1 : 5456586062647081

Red Status 2 : 8283848586878889

In order to reduce judgment, We add a prefix to the top of each

Black Status 1 : **1**0001020304050607

Black Status 2 : **2**0819252729313335

Red Status 1 : **3**5456586062647081

Red Status 2 : **4**8283848586878889

## Special Values

There are some special values reserved for special effects.

We use **99** to describe the piece has been killed. Fox example:

100010203040506**99** , means the black piece 8 Ma has been killed.

## Global Games Status

```
1 // Chinese code means now status
2 // 1 means game start
3 // 2 means black move
4 // 3 means red move
5 // 4 means game end red is winner
6 // 5 means game end black is winner
7 // 6 means game end both sides tied
8 // 7 means red ask for a draw
9 // 8 means red ask for black negative over time
10 // 9 means black ask for a draw
11 // 10 means black ask for red negative over time
12 // 11 red accept for the new status
13 // 12 black accept for the new status
14
15 code : u8
```

## Interface Design

- (1) : Game Prepare Interface
- (2) : Chess drop interface
- (3) : Stop Game interface

## Contract Validation

### 1、Check the Target address Legality

By the appointment, we only have 90 code per piece, For example

If one piece move to target 92 , that is illegal

### 2、Check moving your own piece

Check if it is your turn to move piece

Check if the moving piece is your own.

### 3、Check the piece's Destination

Play by the Chinese chess rules, every piece's move has it rule.

In this step , we check if the piece can reach the Destination, Include the following:

- (1) : Conforming to the game rule
- (2) : Has the condition like bow a horse's leg
- (3) : Coordinate of target has my own piece
- (4) : Has opposing chess piece, change his status

## Front–end page display

Display Address : <http://120.78.222.245:53211/>



The image shows a screenshot of a Chinese Chess game interface on the left and its corresponding DevTools console on the right.

**Chessboard Status:** The chessboard is displayed with pieces in their starting positions. The top row (Black) contains: 车 (Chariot), 马 (Horse), 相 (Elephant), 仕 (Advisor), 帅 (King), 仕 (Advisor), 相 (Elephant), 马 (Horse), 车 (Chariot). The bottom row (Red) contains: 车 (Chariot), 马 (Horse), 象 (Elephant), 士 (Advisor), 将 (King), 士 (Advisor), 象 (Elephant), 马 (Horse), 车 (Chariot). The middle rows contain: 炮 (Cannon), 兵 (Pawn), 卒 (Pawn), 炮 (Cannon).

**The Leo Smart Contract Status:** The DevTools console shows the game state. The status is: `down status is {side: 1, click: {x: 0, y: 0}, board: Array(10), nextPace: Array(12), color: 'b', ...}`. The board array contains: `[["c0", "b0", "x0", "s0", "j0", "s1", "x1", "b1", "c1"], [empty, "p0", empty, "p1"], ["z0", empty, "z1", empty, "z2", empty, "z3", empty, "z4"], [empty, "p0", empty, "p1", empty, "p2", empty, "p3"], [empty, "p0", empty, "p1", empty, "p2", empty, "p3"], [empty, "p0", empty, "p1", empty, "p2", empty, "p3"], ["c0", "b0", "x0", "s0", "j0", "s1", "x1", "b1", "c1"]]`. The nextPace array contains: `[Array(2), Array(2), Array(2), Array(2), Array(2), Array(2), Array(2), Array(2), Array(2), Array(2), Array(2), Array(2)]`. The status also includes: `chessChange: null, clearChessNode: false, click: {name: 'p1', type: 'p', side: 1, position: Array(2), color: 'b', ...}, color: 'b', difficulty: 3, dispatch: null, history: [Array(10)], mode: 3, nextPace: [Array(2), Array(2), Array(2), Array(2), Array(2), Array(2), Array(2), Array(2), Array(2), Array(2), Array(2), Array(2)], paceHistory: [], showModel: false, side: 1, winner: null`.

## Future Development Goals

- (1) : Player points system to record the player score or odds
- (2) : A platform to matching players
- (3) : Expand other games to the platform