**Niu Niu Poker Game**

**I. Game rules**

**General rules**

1. Cards count the same number of points as in baccarat: aces = 1, 2-10 = pip value, face cards = zero. As in baccarat, if a group of cards has a total point value greater than 9, then the tens digit is dropped and the point value of the hand is the terminal digit of the sum of the individual points.
2. There are five cards. Three-card hand is zero points and the two-card hand has 1 to 9 points. The more points within this range, the higher the rank. For example, (4, 6, Q, 9, 9) is Bull 8
3. Impossible to make zero points in the three-card hand. For example, (7, 8, A, 4, J) is No bull
4. Three-card hand and two-card hand are both zero points, known as a "Niu Niu." which translates to "bull bull" in English. For example, (7,8,5,K,10) is Niu Niu
5. In Niu Niu poker game, the one with a higher ranking wins the game. For example, if player A is Bull 9, player B is Bull 5, player C is Niu Niu, play D is No bull, then player D should pay player A twice the bets, player B one times the bets, player C three times the bets. Player C in this round has the highest ranking, so player C wins player A, player B and player D three times the bets. Player B should pay player A twice the bets, player C three times the bets, while wins player D one times the bets. Player A wins player B twice the bets, player D twice the bets, while pays player C three times the bets. (In this demo game, it only allows two players at a time)

**General hands**

No bull: for example, 10 3 2 Q 6 is No bull, because it is impossible to make zero points in the three-card hand

Bull 1-9: for example, 10 3 7 Q 6 is Bull 6

Niu Niu: for example, 10 3 7 Q K is Niu Niu

**Ranking of hands**

Spades > Hearts > Club >Diamond

No bull, the side with the highest ranking card shall win. The ranks of the cards, from highest to lowest, is: K>Q>J>10>9>8>7>6>5>4>3>2>ACE.

Bull 1-9, the more points within this range, the higher the rank. From highest to lowest, is 9-8-...A

Niu Niu, in the event that the highest ranking card does not break a tie, then the highest ranking suit shall win. The order of suits, from highest to lowest, is Spades > Hearts > Club >Diamond.

**Scoring methods**

Five calf -------------------------------------------------- 7 times and the bets

Bomb (Four cards of the same rank)----------------------- 6 times and the bets

Gold Bull (All face cards)---------------------------------- 5 times and the bets

Silver Bull (Four face cards)------------------------------- 4 times and the bets

Niu Niu--------------------------------------------------- 3 times and the bets

Bull 7, Bull 8, Bull 9---------------------------------------- 2 times and the bets

No bull---------------------------------------------------- 1 times and the bets

Face cards are K, Q, J. The scoring method between the banker and the player is fixed. The amount of money won by the banker is directly proportional to the amount of money lost by the player. For example, if the player bets 1 BSV, and the banker gets Niu Niu and wins, then the player should pay 3 times the bets, which is 3 BSV, to the banker. So the amount of winning and losing chips between the two sides is fixed.

**II. Implementation logic**

1. Both players generate a random number
2. Write each random number’s hash, both players’ public keys, and the stake to the contract of this game. The amount to be locked is twice the maximum multiple of the stake (e.g. if the stake is 1BSV and the maximum multiple of the stake is 7BSV, then the amount to be locked is 14BSV. The reason for locking in more money is to avoid players not showing their cards, which would prohibit the game from proceeding, so locking in more money can prevent players from not showing their cards. They need to show their cards to get their deposit back)
3. Each player need to show the random number to take the other player’s maximum multiple of the stake (7BSV). In this way, the players will be motivated to show their cards. If one player does not show the cards, the other player can take all of the locked amount.
4. Both players reveal random numbers off chain, generate cards according to the algorithm and get the game result as well as the corresponding multiple
5. A proof is generated for the game result as well as the corresponding multiple
6. Either side can construct the transaction (normally the winner will initiate the construction). Using the proof and the multiple to construct the transaction. The vout in the transaction is the amount that is output to the players based on the win/lose multiple. (e.g. 14 BSV left in the pool and the winner’s multiple is 3. Then the vout for the winner is 10BSV and the vout for the loser is 4BSV)

