The Mod Stack

This was a stack I devised to enable me to play with memorized deck routines. It is not meant as a replacement for a memorized deck. However, it works very well if you just occasionally want to try something out – with a few minutes work, you can compute the card at any position, or the position of any card. The advantage of it over a memorized deck is that it is easy to learn and you don’t have to mentally maintain it, the disadvantage is that it is not as fast as a memorized deck.

I really wanted a mathematical stack that would transform 52 numbers into 52 different numbers and do it very simply. Then by doing some simple math in my head I could compute which card was at which position. The key was to keep the math simple. Joe M. Turner pointed me to “Richard’s Stack”, devised by Richard Uhrich, which I played with. The problem there is that it required going from decimal to octal, and while that’s not too difficult it took too long to do the calculations. I wanted something very simple. However, many simple computations came up with a stack that was in a clearly organized stack – if all the colors alternate regularly, it’s not very random looking, for example. In the stack I am presenting here, the toughest math is multiplying or dividing by four. If you can do that, you’ll have no trouble with the math.

The key idea of Richard’s Stack was reversing the numbers. I used this idea and came up with a stack that I find very simple to compute, yet will put the cards in a pretty mixed up order.

First, I have to assign a value to each card. This turned out to be very important. The value again had to be easy to compute, but the simplest ways turned out to leave the deck looking ordered, so I didn’t want to use them. In the end, multiplication by four turned out to be the best solution, combined with the CHaSeD order to give each suit a value –

C = 0

H = 1

S = 2

D = 3

Take each card value and multiply it by four. Then add the suit value listed above. So if it’s a club, add nothing. Add one for hearts, two for spades, and three for diamonds. That’s the card value.

So for an example, let’s look at the 5 of Diamonds. The value is 23 – 5 times 4 is 20, plus 3 for the diamond.

To reverse this step to go from a number value to a card, just divide the number by four. The remainder determines the suit – no remainder is a club, 1 is a diamond, 2 spades, and three diamonds, just as before. So take 23, divide by 4 and you have 5 remainder 3. Three is diamonds, so it’s a five of diamonds.

The only math is multiplying and dividing by four, and that’s as hard as it gets. There is an exception, though, and that’s the kings. I gave the kings values 1, 2, 3, and 52 in CHaSeD order – King of Clubs is 1, etc. Having that exception for the kings kept the next step much simpler.

So now each card has a value. The next step is to morph that value to place the card in a random looking position in the deck. To do this, just reverse the digits. So the five of diamonds has a value of 23. Reversing the digits tells us that the card is in location 32.

For another simple example, let’s look at the seven of spades. Seven times four is 28, plus 2 for the spades, gives a value of 30. Reversing the digits in 30 gives us 03 – so the card is in location 03, the third card in the stack. Similarly, the king of spades with a value of three (or 03, just imagine a zero before the three) is the 30th card in the stack.

You will quickly realize that this only works for half the deck. The other half will give you a card position above 50 – for example, the 9 of Hearts has a value of 9 times 4 = 36 plus 1 for being a heart = 37…reversing the digits gives us 73. I wanted to subtract 50 which would be simple, but that takes us to a location already used. So for this stack, subtract 45. This is MUCH easier than it sounds as you can use a trick. Picture the two digits in 73. Now lower the first one by 5 and raise the second one by 5. For the numbers in this stack, that will always work. I picture it as moving 5 from the first number to the second. So 73 becomes 28.

|  |  |
| --- | --- |
| 7 | 3 |
| 7-5 | 3+5 |
| 2 | 8 |

More examples…let’s look at 39. Reverse the digits to get 93. That’s higher than 50, so we take five from the 9 and move it to the 3, making it 48. So the card with value 39 is the 48th card in the stack.(39 divided by 4 is 9, reminder 3, so the card is the nine of diamonds.)

Let’s do one more example like that. 35 reverses to 53. This is higher than fifty, so move five from the first digit to the second. 5-5 is zero, and 3+5 is 8, so this maps to the 8th location in the stack.

So let’s take the seven of diamonds. That has a value of 31 (7 times 4 = 28 plus three for the diamond is 31.) 1 is less than five, so that is in deck position 13.

The only exceptions are stack numbers 50,51,and 52. Since they are higher than 50, this method won’t work on those numbers. 51 and 52 give the same value as 1 and 2, and 50 ends up being 5, also a repeat. So I just leave those alone. This means the QS, QD, and KD just map to themselves. My stack thus ends in several court cards in a row, but that’s not abnormal enough to be noticed.

So far you can take a card, compute a value and transform that value into a stack location. It would be nice to take a stack location, compute the value, and transform the value back to a card. This can be done by reversing the steps.

Start with an easy one – location 13. Reverse the digits, and it’s card value 31. Now divide 4 into 31. 4 times 7 is 28, with a remainder of three. The remainder maps to the ChaSeD card values (C,H,S,D -> 0,1,2,3) so this is a 7 of Diamonds.

If you want to know what card is in location 28, just reverse the digits to get 82. 82 is higher than 50, so move five from the 8 to the 2 – 8-5 is 3, and 2+5 is 7, so 82 becomes 37. Now divide 37 by 4. 4 goes evenly into 36 9 times, so this is 9 remainder 1. This is a 9 of Hearts.

Figuring Out the Next Card in the Stack

Pierre Emmanuel figured this out and it’s pretty cool. If you figure out a card in the stack you can always figure out the next card by going from the card number to the stack number, adding one to that, and going back to a card value. But it’s actually quite a bit easier.

Say you’re looking at the five of clubs. That card value is 20 (five times four, plus nothing for the clubs, and you have 20.) Reverse the numbers and it’s in stack position 2. So what’s in stack position 3? If you know the card value, add ten to it – and that is the value of the card in the next position. So for our card value of 20, the next card will have the value 30 – that is 4 times 7 remainder 2, so Seven of Spades.

So once you can get from a card to a card value, just adding ten will always tell you the next card in the stack!

Almost.

If the value you end up with is over 50, this won’t work. But Pierre found a pretty cool trick for the rest. In brief, instead of adding ten, take the second digit and add five to it. If that is larger than ten, then add the two digits together. That sounds complicated, but it really is quite easy.

For card values 40, 41, 42, 43, and 44 take the second digit plus 5 – 5, 6, 7, 8, 9.

For card values 45, 46, 47, and 48, take the second digit and subtract 4 – 1, 2, 3, 4.

In one sentence, if the second digit is below five, then add five. If it’s above five, subtract four.

Also, note that the last several cards are set, so if you’re at value 49, the next three are 50, 51, and 52 so don’t follow the steps above!

A table with all the values follows. If you want to use this stack, use this table to generate a practice deck. Get a sharpie marker, and on the top of each card write the card value. On the bottom, write the stack location. I usually do this by taking a new deck and making 13 piles of each suit so each card is in CHSD in a pile by itself. Then stack those piles up as shown in the right column so that they are in order (KC, KH, KS, AC, AH, etc.) Then on the top of each card, write the card number (01, 02, 03, etc. –always write both digits!)

Now redo your practice deck so that it’s in the stack order as shown in the left side (2S, 5C, 7S, 10C, etc.) On the bottom of each card, write the stack number (1, 2, 3, etc.)

Now with a face down deck, the top card will be a 2 of spades, and will have a 10 on the top half and a 01 on the bottom half.

Now you can look at the face of a card, and compute the value. Check the top to see if you are right. Then compute the stack location and check the bottom to see if you got that. Alternately, put the deck face down and pick a stack number (the bottom half of the back.) Compute the card value and look at the top half to see if you got that correctly. Then figure out what card it is, and see if you got that as well.

It takes surprisingly little time to get comfortable with this. It’s really worth giving it a try.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Stack # | Reversed | Mod 50 | Add 5 | Card Value | | Card # | Card Value |
| 01 | 10 | 10 | 10 | 2S |  | 1 | KC |
| 02 | 20 | 20 | 20 | 5C |  | 2 | KH |
| 03 | 30 | 30 | 30 | 7S |  | 3 | KS |
| 04 | 40 | 40 | 40 | 10C |  | 4 | AC |
| 05 | 50 | 0 | 5 | AH |  | 5 | AH |
| 06 | 60 | 10 | 15 | 3D |  | 6 | AS |
| 07 | 70 | 20 | 25 | 6H |  | 7 | AD |
| 08 | 80 | 30 | 35 | 8D |  | 8 | 2C |
| 09 | 90 | 40 | 45 | JH |  | 9 | 2H |
| 10 | 01 | 1 | 1 | KC |  | 10 | 2S |
| 11 | 11 | 11 | 11 | 2D |  | 11 | 2D |
| 12 | 21 | 21 | 21 | 5H |  | 12 | 3C |
| 13 | 31 | 31 | 31 | 7D |  | 13 | 3H |
| 14 | 41 | 41 | 41 | 10H |  | 14 | 3S |
| 15 | 51 | 1 | 6 | AS |  | 15 | 3D |
| 16 | 61 | 11 | 16 | 4C |  | 16 | 4C |
| 17 | 71 | 21 | 26 | 6S |  | 17 | 4H |
| 18 | 81 | 31 | 36 | 9C |  | 18 | 4S |
| 19 | 91 | 41 | 46 | JS |  | 19 | 4D |
| 20 | 02 | 2 | 2 | KH |  | 20 | 5C |
| 21 | 12 | 12 | 12 | 3C |  | 21 | 5H |
| 22 | 22 | 22 | 22 | 5S |  | 22 | 5S |
| 23 | 32 | 32 | 32 | 8C |  | 23 | 5D |
| 24 | 42 | 42 | 42 | 10S |  | 24 | 6C |
| 25 | 52 | 2 | 7 | AD |  | 25 | 6H |
| 26 | 62 | 12 | 17 | 4H |  | 26 | 6S |
| 27 | 72 | 22 | 27 | 6D |  | 27 | 6D |
| 28 | 82 | 32 | 37 | 9H |  | 28 | 7C |
| 29 | 92 | 42 | 47 | JD |  | 29 | 7H |
| 30 | 03 | 3 | 3 | KS |  | 30 | 7S |
| 31 | 13 | 13 | 13 | 3H |  | 31 | 7D |
| 32 | 23 | 23 | 23 | 5D |  | 32 | 8C |
| 33 | 33 | 33 | 33 | 8H |  | 33 | 8H |
| 34 | 43 | 43 | 43 | 10D |  | 34 | 8S |
| 35 | 53 | 3 | 8 | 2C |  | 35 | 8D |
| 36 | 63 | 13 | 18 | 4S |  | 36 | 9C |
| 37 | 73 | 23 | 28 | 7C |  | 37 | 9H |
| 38 | 83 | 33 | 38 | 9S |  | 38 | 9S |
| 39 | 93 | 43 | 48 | QC |  | 39 | 9D |
| 40 | 04 | 4 | 4 | AC |  | 40 | 10C |
| 41 | 14 | 14 | 14 | 3S |  | 41 | 10H |
| 42 | 24 | 24 | 24 | 6C |  | 42 | 10S |
| 43 | 34 | 34 | 34 | 8S |  | 43 | 10D |
| 44 | 44 | 44 | 44 | JC |  | 44 | JC |
| 45 | 54 | 4 | 9 | 2H |  | 45 | JH |
| 46 | 64 | 14 | 19 | 4D |  | 46 | JS |
| 47 | 74 | 24 | 29 | 7H |  | 47 | JD |
| 48 | 84 | 34 | 39 | 9D |  | 48 | QC |
| 49 | 94 | 44 | 49 | QH |  | 49 | QH |
| 50 |  |  | 50 | QS |  | 50 | QS |
| 51 |  |  | 51 | QD |  | 51 | QD |
| 52 |  |  | 52 | KD |  | 52 | KD |

Appendix

After sharing this stack with the Magic Café it was pointed out to me that it shared a lot in common with the Bart Harding Card System. It does indeed use a lot of the same tricks to get to a similar place. The difference seems to be that we started with a different card order, and Bart adds either nothing, 13, 26 or 39 to it based on suit. I multiply the value by four and add the suit. Most of the rest of our stacks seem to just line right up.

That being said, I had never heard of his system when I devised mine, so that was quite a surprise!