

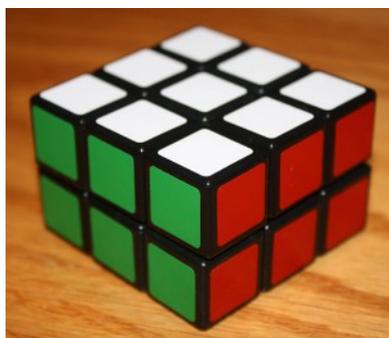
EPIC 3x3xN Solution

by admin - Tuesday, July 26, 2011

<http://jakerueth.com/blog/?p=404>

This is a minimalistic guide for solving 3x3xN cuboids, where N does not equal one or three. Prior knowledge of solving a 3x3 required for higher ordered versions, preferably experience in scrambling/solving a cube using 180 degree face turns.

Lets start at the beginning with the:
3x3x2 or Domino Cube



Hasbro released a computer game, Rubik's Games, back in 1999. I remember playing with a computer simulation of the 3x3x2 before playing with a physical version.



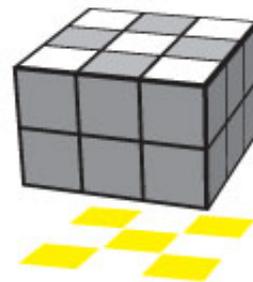
The first version I've seen of the 3x3x2 was the Domino Cube, released by Rubik in 1983. These rare puzzles would pop up on ebay and fetch \$400 back in the 90's. I picked up my first domino cube in 2005(ish) for \$50 as more and more started resurfacing. Unfortunately, now the puzzle is being knocked off and recreated by various vendors.

Back in the late 90's early 2000's, a member of the Twisty Puzzles forum posted a cool thread about creating 2x2x3 and 3x3x2 cuboids by attaching regular sized 3x3 pieces to a keychain cube. Many brave puzzle builders jumped on building their own cuboids by hacking their cubes apart, I too attempted to build one but mine didn't come out all that well and ended up being fragile and falling apart...

But enough history, lets get to solving!



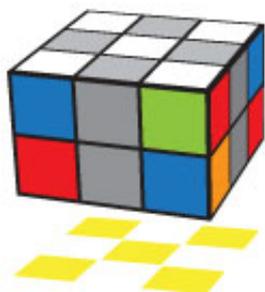
1. Distribute Corners



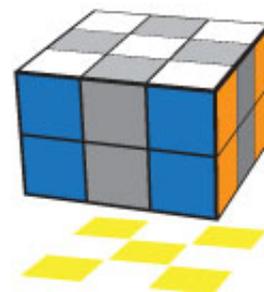
1. Distribute Corners

This step is fairly easy and does not require algorithms to complete. Basically, distribute top corners to the top, and bottom corners to the bottom.

This can be completed in a few turns.

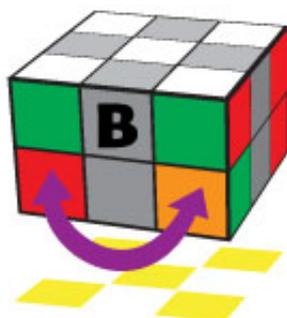
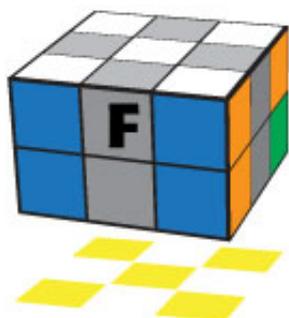


2. Permute Corners



2. Permute corners

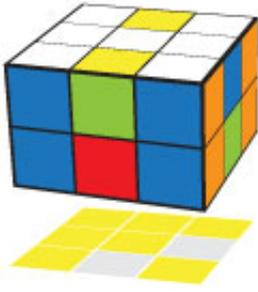
I generally start of by solving the top 4 corners. Shuffling these around is pretty easy. Sometimes the bottom 4 pieces fall into place, but sometimes they don't. This is the alg I use to finishing the bottom corners and it swaps the Down Back Left corner with Down Back Right corner:



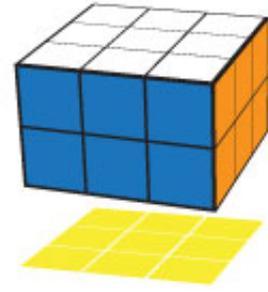
R F (D' F D R)x2 D'

DBL <-> DBR R F (D' F D R)x2 D'

Sometimes you may need to use the move twice.

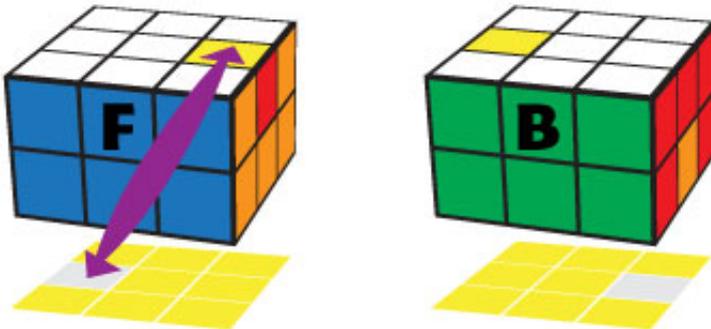


3. Permute Edges



3. Swap Edges

This alg swaps the Down Left Edge piece with Up Right Edge piece:



R (D2 F)x3 R

DL <-> UR **R (D2 F)x3 R**

After using this alg multiple times, the puzzle should be solved.

Now that you should have a good grasp of solving the 3x3x2, you can apply the same algorithms to higher order cuboids. Let's move up to the 3x3x4.

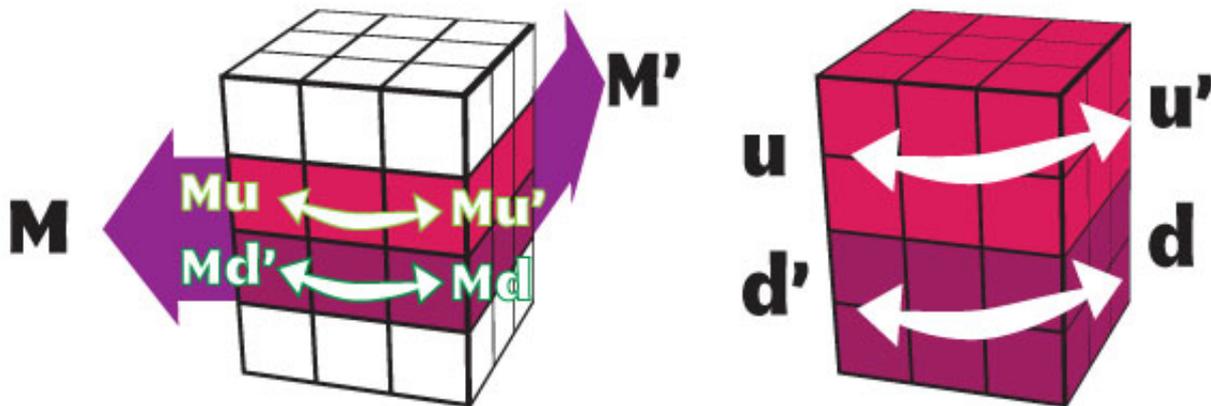
3x3x4



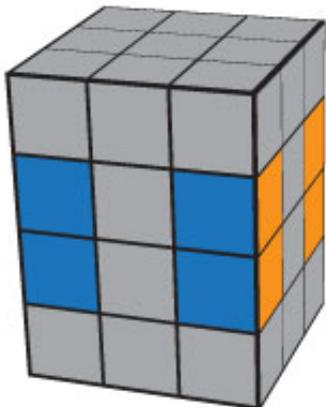
The 3x3x4 is one of my favorite puzzles. I picked this one up at Cube4you.com as a DIY kit. Assembly is super easy and the puzzle is smooth turning and a joy to play with.

The cool thing is there isn't much new to learn when solving this puzzle. You can apply the same algs from the 3x3x2 to the 3x3x4. The added middle layers lead to some different situations but its pretty easy to work these out.

Before we begin, lets first confirm notation. With the added middle layers these leads to some new turns. Lets note the 2 middle layers together as "M" where "Mu" is the Upper Middle layer and "Md" is the Down Middle layer. A lower case "u" or "d" means turn the Upper half or lower Half of the puzzle.



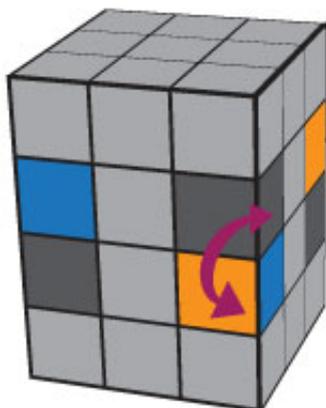
Alright! Lets jump into a solve!



1. Solve middle layer corners

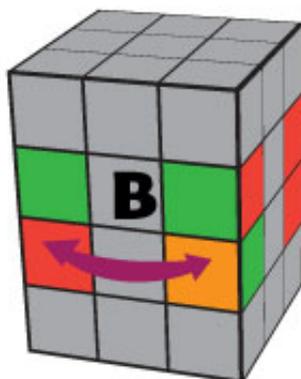
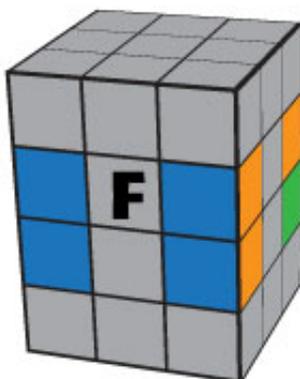
1. Solve middle layer corners

I start off by placing 3 corners in the Mu layer. Usually the 4th piece ends up in the Md layer. I position the pieces so the FRMu slot is where my 4th piece needs to go. I then rotate the Md layer until the FRMu piece is in the FRMd slot. Then I execute this algorithm:



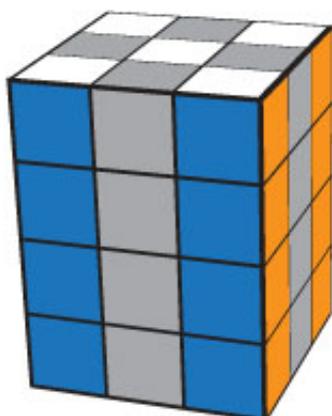
R md' R md R

Now with the Mu Layer solved, it is time to fix the Md Layer. Sometimes the Md Layer is already solved, other times it requires pieces to be swapped. The cool thing is we can use the same alg from the 3x3x2 to fix these pieces.



R F (d' F d R)x2 d'

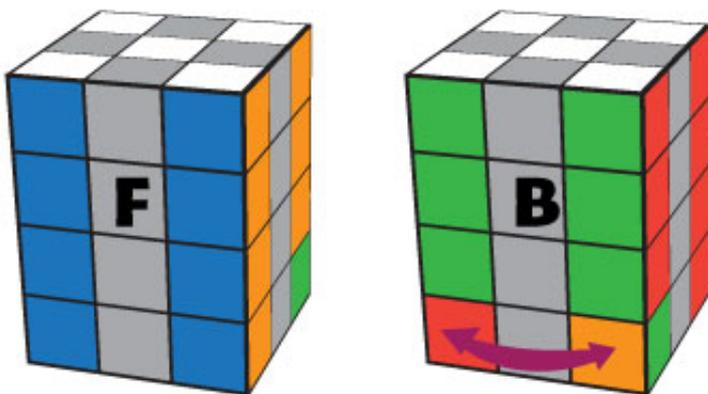
This algorithm swaps the "B Md R" and "B Md L" Corners. With this algorithm you can complete the first step.



2. Distribute & Solve Outer Corners

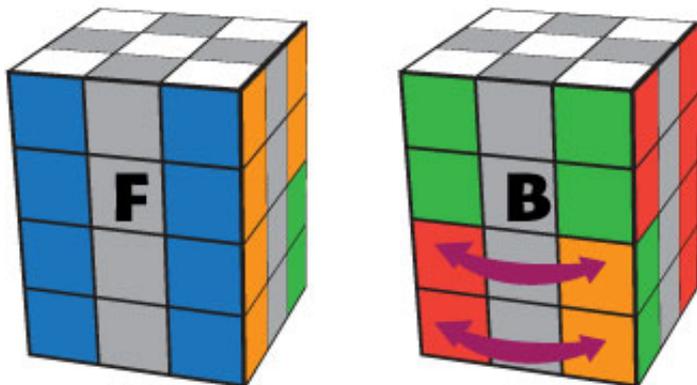
2. Distribute and Solve outer corners.

I start off by putting all my white corners on top and yellow on the bottom. I usually place my white corners in the proper places right away. You can do this without messing the middle layers by rotating the U face, D face, and restricting to the R face. With the white pieces solved on top, this will leave you with the yellow corners in either a solved or unsolved state. Again, similar to the 3x3x2, you can use the same algorithm.



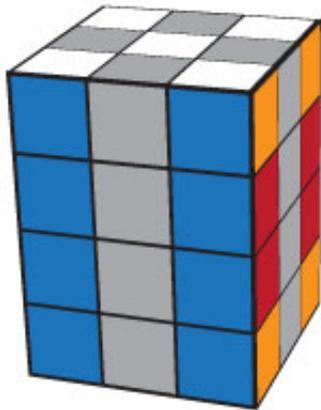
R F (D' F D R)x2 D'

If you are like me, you like to combine steps when possible. The cool thing is you can swap the Md corners and D corners at the same time:



R F (d' F d R)x2 d'

The nice thing about combining steps is it won't distort middle corners. However if you execute the alg that only swaps the D corners, you may end up with a middle layer parity case which leads to the next step.

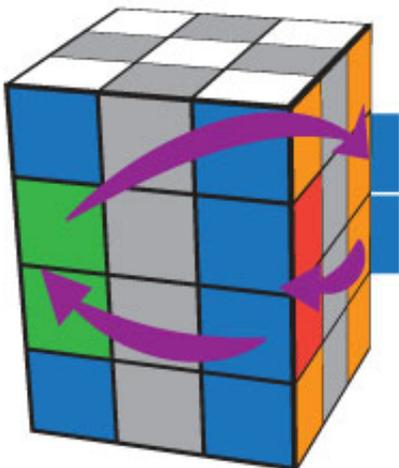


3. Resolve Parity

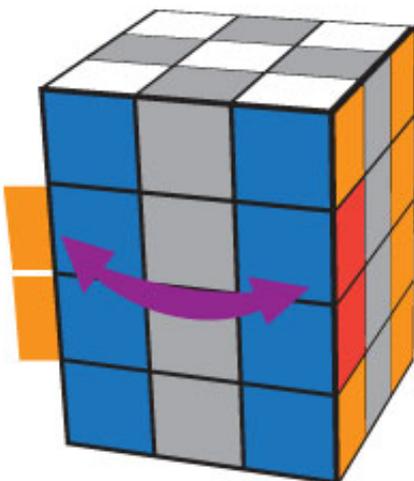
3.

Resolve Parity

There are 2 cases that may come up. One is a 3 corner swap the other is a 2 corner swap. Here are the algs:

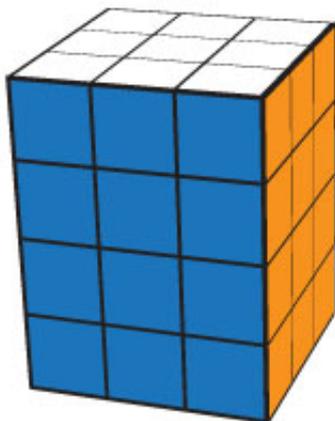


F M F M'



Md2 F Md2
F Md2

Once you have the corners all in place it is time to move on to solving the edges.

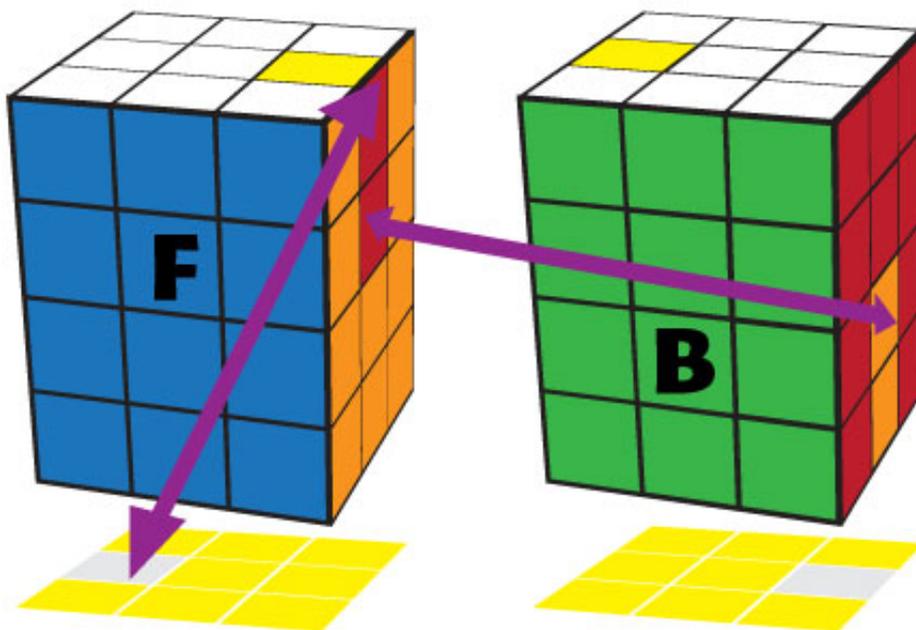


4. Solve Inner & Outer Edges

4. Solve

Edges

This is my favorite part of the solution. Much like combine steps in 1 and 2, I focus on placing both middle edges and outer edges at the same time using the same alg from the 3x3x2 method.



R (d2 F)x3 R

Executing this algorithm will swap the MdL Edge with the MuR edge as well as the DL edge with UR edge. You will need to do setup rotations to effectively complete this step. I find this algorithm fun to perform.

Repeat using the alg to complete the puzzle.

You may also change the "d"s in the alg to "D" to only execute the swap of the DL and UR pieces. Warning, this will require fixing the middle corners again as it will swap the LF corners with BR corners in the M layer.



So now with the puzzle complete you can see how easy it was to implement the same algs from a 3x3x2 to a 3x3x4. The same goes to solving higher ordered 3x3xN puzzles. I use the same solution to solve my 3x3x5 and 3x3x7. The only changes is that these puzzles actually function as a 3x3x3 cube. This shouldn't be much of a challenge as you can combine your 3x3 experience as well as this method for the 3x3x4 to complete the higher ordered variants.

In closing, this is a basic method and not a speed-cubing method. Though you can use it to solve the 3x3x2 and the 3x3x4 fairly quick there are probably faster solutions with more algorithms to learn depending on how seriously you take your speed-solving. Thanks for checking out the article, I hope it helps, feel free to leave feedback and questions in the comments below.