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Su-Pu Studies · Lesson 03

The Three-Way Fork: Restructuring Multiple Branches

When three candidates vie for one position, treat it as two binary decisions—and watch a Hell-tier puzzle collapse.

Written by **the Orbace Sudoku Editorial Team** · July 30, 2026 · 8 min read ·

Su-Pu Studies

Hell-tier

Ibtree

Proof by Contradiction

Binary Tree

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01 · OPENING

Opening Moves

The previous lessons in this series presented puzzles with clear two-way forks—positions where a candidate had exactly two possible homes, making the decision tree structure immediately obvious. This session starts differently.



Imported 65D4DB

Extreme | 1:57 | Mistakes 0 | Hints 0

6	3	5						
7	² ₈	² ₈	1					6
4	9	1						
						4	7	
2			7					
						5	9	
		6		9	7			
₉		₉		3	5			
8								7

After initial examination, a few numbers are confirmed along with a naked pair. No obvious binary fork stands out yet.

After the first pass—confirming a few givens and spotting a naked pair that would eventually help determine another number—the grid offers no compelling candidate pairs that might trigger a long forced chain. The usual entry points for an ibtree approach seem absent.

02 · FORK

The Fork

But wait. Box 7 contains three potential positions for the candidate 9. On the surface, that's a three-way fork—not the binary structure the ibtree method prefers.

A three-way fork is just two binary decisions in sequence. Test one candidate against the group. If it fails, test the second against the third. Two proofs by contradiction narrow three possibilities down to one.

Conceptually, any multi-way decision can be restructured as a series of binary choices. In this case, two of the three candidate positions can trigger distinct forced chains, making them ideal test branches.

First Branch

The solver begins by assuming the first candidate position is true and tracing its consequences forward.



Imported 65D4DB

Extreme | 2:42 | Mistakes 0 | Hints 0

6	3	5						
7	² ₈	² ₈	1					6
4	9	1						
						4	7	
2			7					
						5	9	
		6		9	7			
				3	5			
8		₉						7

STEP 1 Testing the first candidate position in Box 7.

After applying basic sudoku rules across Box 1, Box 4, and Box 7, the conflict emerges quickly.



Imported 65D4DB

Extreme | 3:15 | Mistakes 0 | Hints 0

6	3	5						
7	² ₈	² ₈	1					6
4	9	1						
₉						4	7	
2			7					
						5	9	
₅		6		9	7			
				3	5			
8		₉						7

STEP 2

The contradiction is unmistakable—this candidate cannot occupy this position.

The first branch collapses. That position is eliminated.

04 · SECOND BRANCH

Second Branch

With one candidate ruled out, the solver tests the second position.



Imported 65D4DB

Extreme | 4:31 | Mistakes 0 | Hints 0

6	3	5						
7	² ₈	² ₈	1					6
4	9	1						
						4	7	
2			7					
						5	9	
		6		9	7			
		₉		3	5			
8								7

STEP 3

Testing the second candidate position in Box 7.

Again, a short chain of forced placements leads to a visible conflict in Box 4.



Imported 65D4DB

Extreme | 5:01 | Mistakes 0 | Hints 0

6	3	5						9
7	² ₈	² ₈	1		⁹			6
4	9	1						
			⁹			4	7	
2			7					
						5	9	
		6		9	7			
		⁹		3	5			
8						⁹		7

STEP 4

Another contradiction. This candidate also fails.

Two contradictions, two eliminations. Only one candidate position remains.

05 · CONFIRMATION

Confirmation

Combining the two proofs by contradiction, the candidate must occupy the third position in Box 7.



Imported 65D4DB

Extreme

|

5:29

|

Mistakes 0

|

Hints 0

6	3	5						
7	² ₈	² ₈	1					6
4	9	1						
						4	7	
2			7					
						5	9	
		6		9	7			
9				3	5			
8								7

The candidate's position is confirmed by elimination. No direct proof needed—two contradictions leave only one possibility.

This is the structural power of treating a three-way fork as sequential binary decisions. Each contradiction narrows the field until only the true placement remains.

06 • FINISH

The Finish

Once the candidate is placed, the puzzle's difficulty collapses. What was rated as a Hell-tier grid—Hodoku 2216, Sudoku Explainer 7.2—becomes a moderate solve from this point forward.



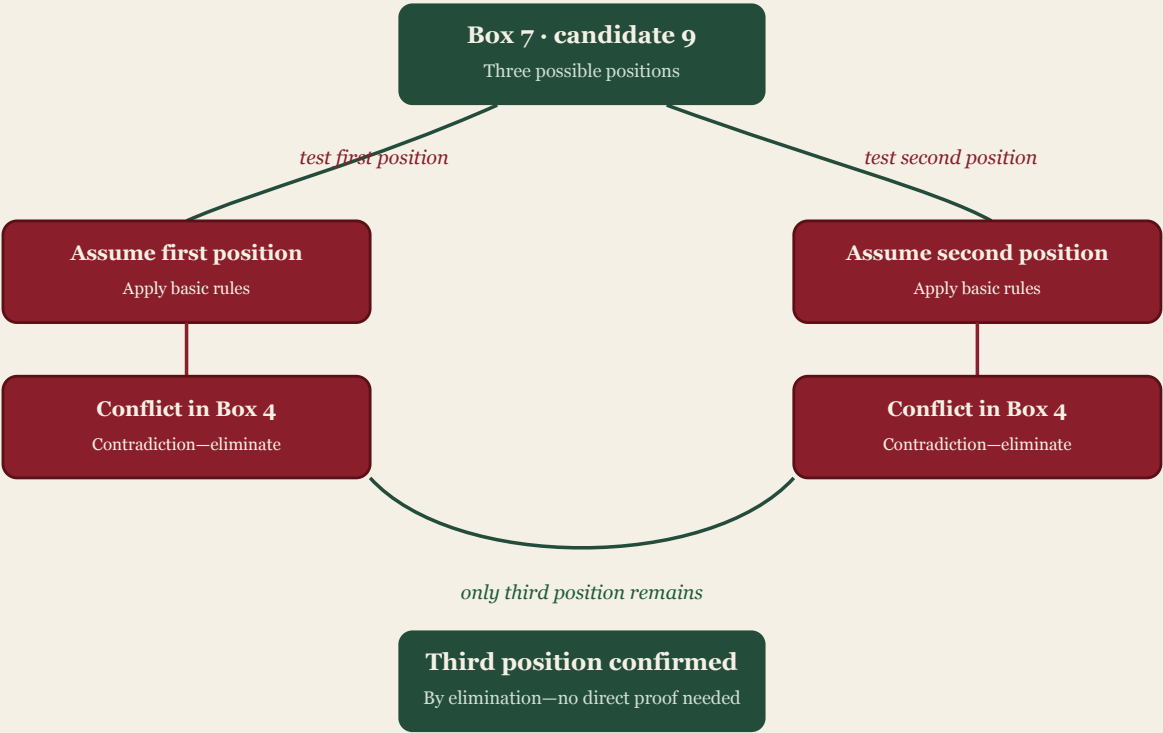
Imported 65D4DB

Extreme | 10:06 | Mistakes 0 | Hints 0

6	3	5		7			4	9
7	² ₈	² ₈	1	4	9	3	5	6
4	9	1	5	6	3			
			9			4	7	
2		9	7					
			3			5	9	
		6		9	7			
9				3	5			
8						9		7

The rest of the puzzle resolves directly. The three-way fork was the only structural bottleneck.

The observation and intuition to restructure the fork as two binary tests paid off enormously. A puzzle that would otherwise demand advanced candidate-reduction techniques became solvable in minutes.



07 • COMPARISON

Ibtree vs. Canred

Had the solver relied solely on standard candidate reduction (canred) techniques, this puzzle would have required a battery of advanced moves: Swordfish (applied twice), 3D Medusa (three times), and Alternating Inference Chain. Each technique demands careful pattern recognition and considerable solving time.

Ibtree	Candidate reduction
Restructure the three-way fork as two binary tests	Catalog all candidate positions across the entire grid
Test two branches, trace each to contradiction	Apply Swordfish twice to eliminate distant candidates
Confirm the third position by elimination	Apply 3D Medusa three times to find deeper conflicts
Puzzle collapses to moderate difficulty	Apply Alternating Inference Chain to resolve remaining ambiguity
Total time: minutes	Total time: considerably longer

The ibtree approach bypasses all of that. By recognizing the structural opportunity—a multi-way fork that can be split into sequential binary decisions—the solver reaches the same confirmed placement in a fraction of the time, using only proof by contradiction and basic rule application.



Try it yourself

The next time a puzzle presents three or more candidate positions, treat it as a sequence of binary tests. Two contradictions often unlock what canred alone would struggle to reach.

[Start a Tea Moment](#)[Previous Lesson](#)

Reconstructed from a real personal Su-Pu replay and checked against the recorded grid. Spotted a step that doesn't hold up? Tell us — every Journal article carries an accountable byline and an open correction channel.

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