

## Homework 2 – Solving NxN Sudoku using Backtracking

Objectives:

- Learn to implement Java interface
- Learn to write Backtracking algorithm in Java

A standard Sudoku puzzle consists of a 9x9 grid, grouped as nine blocks of 3x3 cells. The cells must be filled with the numbers 1 to 9 so each row, each column and each block contains each number just once. There are different variants of Sudoku by size such as 4x4, 9x9 (standard), 16x16 and 25x25. For a NxN puzzle, it always has N rows, N columns, and N boxes. They are very similar to the standard 9x9 puzzle and apply the same set of constraints - "each digit appears once in each group".

In this homework, you are asked to write a program to solve Sudoku puzzle using backtracking algorithm. The program should be designed to solve any NxN Sudoku. However, due to the complexity of large puzzles, only 9x9 and 4x4 Sudoku will be used for testing.

A main class (*Main.java*), an interface (*Solver.java*), and some test cases (under the sub-package *input*) are provided to you. Read the comments in the code carefully, and then create your own solver (*SolverDDDDDDDD.java*) by implementing the interface (where the D-string is your actual student ID).

Note that correctness, efficiency, simplicity, clarity and style of the program are taken into consideration in the marking. You should strictly follow Java programming conventions.

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

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

9x9 Sudoku (left) and its answer (right)

J	4	N						C	B	2	M	P			E	H	O							
H	D		O		6				8		1	A	B	G	C	E	5	L		F				
	8		I		A	K	O	3	B	M		L	F	5	1		H	7		C	6	J		
B		3	K	A			G	L		N	J		H	6	8				D	M	1	2	7	
	L	1	5		M		4	2	N		P				D	J		6	9	B	8	A		
F	H		N	O	4	5			D			M	J		I			6	9	C	8			
5				M		6	F					K	9	A	C			1		L				
	1				I	2		J	K		7		A	B			N		H	O				
6	A		E	G	9			C		L		O		2	5	7	1	8	F	J	K	M		
1	J			K	D	L				1				E	G		3	H			B	5		
M	5	3	L	7		N	A	C	I			F	B		G			K	E		O	2	J	H
	F				B	G		O		1	9		E		7		L	5	K	D		6		
K						1			5	O	H			6			9		N					
D	G					J	5	H	3			K	P		B		N		1	C	E	8		
1		C	B	7	F	6	K	D	2		M		N			4		J			5	9		
L	I		5			A	E		B		1	7		F		N	J			C		D		
8	6	A	H				C	O						I					F	5	7			
3	C	B	1				L	F	9				A	4					7	8	2	N	6	
		E	G			7		1	5	C		L			2			H				K		
		F			O					H	J		4	C				D	3	E	I	1	L	
	N	6	F	H					M	E	K	3				9	P					G	O	2
G	O	5	3	C	P		E	8		F		6				4	B	J	7		I			
9	I	D	8		L	B		6		G			4	H	5	J		C	A		F		1	
	J		1	G		F	7					5	9	N	L		2	A		6		C		
	B				C		9				A		G		8						K	D	E	

J	4	N	7	6	1	9	D	5	8	A	C	G	B	2	M	P	L	F	3	E	K	H	I	O	
H	D	M	O	2	6	P	1	7	J	K	8	4	9	1	A	B	G	C	E	5	L	3	N	F	
9	8	G	I	E	A	K	O	3	B	M	D	L	F	5	1	N	H	7	2	C	P	4	6	J	
B	3	K	A	P	F	C	G	L	E	N	J	O	H	6	8	4	9	5	1	D	M	1	2	7	
C	L	1	5	F	M	H	4	2	N	3	E	P	1	7	O	D	J	K	6	9	B	8	A	G	
F	H	L	N	O	4	5	7	A	1	D	2	E	G	M	J	K	I	B	P	6	3	9	C	8	
5	7	8	B	M	E	6	F	G	P	H	3	1	J	K	9	A	C	4	O	2	1	D	L	N	
4	1	9	C	3	1	2	8	J	K	6	7	5	A	B	L	M	F	D	N	G	H	O	E	P	
6	A	D	E	G	9	3	B	C	H	L	4	N	O	P	2	5	7	1	8	F	I	J	K	M	
I	J	P	2	K	D	L	M	N	O	8	1	9	C	F	E	G	6	3	H	7	4	A	B	5	
M	5	3	L	7	N	A	C	I	9	4	F	B	6	G	D	8	K	E	1	P	O	2	J	H	
N	F	H	J	A	B	G	P	O	4	1	9	C	8	E	1	7	2	L	5	K	D	6	M	3	
K	2	4	P	1	8	E	1	M	L	5	O	H	D	J	6	C	3	9	G	N	7	B	F	A	
D	G	O	6	9	2	J	5	H	3	7	1	K	P	L	B	F	A	N	M	1	C	E	8	4	
1	E	C	8	B	7	F	6	K	D	2	A	M	3	N	H	O	4	P	J	1	G	L	5	9	
L	I	2	M	5	3	4	A	E	6	B	G	1	7	8	F	H	N	J	K	O	9	C	P	D	
8	6	A	H	4	K	M	9	D	C	O	N	2	E	3	P	I	1	G	L	J	F	5	7	B	
3	C	B	1	J	H	I	L	P	F	9	5	D	K	A	4	E	O	M	7	8	2	N	G	6	
O	P	E	G	D	J	7	N	1	5	C	6	F	L	1	3	2	B	8	9	H	A	M	4	K	
7	K	F	9	N	O	8	2	B	G	P	H	J	M	4	C	6	5	A	D	3	E	I	1	L	
A	N	6	F	H	5	D	J	4	M	E	K	3	1	C	7	9	P	1	B	L	8	G	O	2	
G	O	5	3	C	P	N	E	8	A	F	L	6	2	D	K	1	M	H	4	B	J	7	9	I	
P	9	I	D	8		L	B	K	6	2	G	M	7	4	H	5	J	E	O	C	A	N	F	3	1
E	M	J	K	1	G	O	3	F	7	1	B	8	5	9	N	L	D	2	A	4	6	P	H	C	
2	B	7	4	L	C	1	H	9	1	J	P	A	N	O	G	3	8	6	F	M	5	K	D	E	

25x25 Sudoku

A solution to the puzzle

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