Assignment 2 Report

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CPSC371

February 18, 2019

BackTracking

Complexity :: O(n^{n^2})

Anonymous::

Nodes Visited: 4,537 **Time:** 0.248 seconds

Problem

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

→

Solution

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

Omega::

Nodes Visited: 48,195 **Time:** 2.674 seconds

Problem

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

→

Solution

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

Tim::
Nodes Visited: 1,001 **Time:** 0.053 seconds

Problem

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

→

Solution

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

Colton::
Nodes Visited: 221 **Time:** 0.023 seconds

Problem

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

→

Solution

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

Ayla::
Nodes Visited: 6588 **Time:** 0.347 seconds

Problem

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

→

Solution

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

Reece::
Nodes Visited: 313 **Time:** 0.015 seconds

Problem

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

→

Solution

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

Austin::
Nodes Visited: 11,458 **Time:** 0.696 seconds

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

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

Mitchell::
Nodes Visited: 2,306 **Time:** 0.118 seconds

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

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

Dylan::
Nodes Visited: 27,581 **Time:** 1.750 seconds

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

$\rightarrow$

AlsoTim::
Nodes Visited: 1,893,654 **Time:** 99.593 seconds

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

$\rightarrow$

6

Michael::
Nodes Visited: 484 **Time:** 0.040 seconds

Problem									→	Solution								
		6	4	8	1	3				9	5	6	4	8	1	3	2	7
	2						4			1	2	3	6	7	9	5	4	8
7								9		7	4	8	2	5	3	6	1	9
8			9					4		8	3	2	1	9	5	7	6	4
6			3	4	2			1		6	7	9	3	4	2	8	5	1
5				6				2		5	1	4	8	6	7	9	3	2
3								5		3	6	7	9	2	4	1	8	5
	9					7				2	9	1	5	3	8	4	7	6
		5	7	1	6	2				4	8	5	7	1	6	2	9	3

Graeme::
Nodes Visited: 7108 **Time:** 0.393 seconds

Problem										Solution								
					7	5				1	4	9	2	3	7	5	8	6
7			1				4			7	6	2	1	5	8	9	4	3
5						2				5	8	3	9	6	4	2	1	7
		1	3	9				8		4	7	1	3	9	2	6	5	8
3			7	8	6		→	4		3	2	5	7	8	6	1	9	4
8				4	1	7				8	9	6	5	4	1	7	3	2
		8						9		6	1	8	4	7	5	3	2	9
	5				3			1		9	5	7	8	2	3	4	6	1
		4	6							2	3	4	6	1	9	8	7	5

Ryley::
Nodes Visited: 119,742 **Time:** 6.948 seconds

Problem → Solution

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

AlsoRyley::
Nodes Visited: 391 **Time:** 0.040 seconds

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

Me::
Nodes Visited: 1,849 **Time:** 0.125 seconds

Problem

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

Solution

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

Forward Checking

Complexity :: $O(n^{n^2})$

Anonymous::
Nodes Visited: 1,849 **Time:** 0.125 seconds

Problem

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

Solution

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

Omega::
Nodes Visited: 87 **Time:** 0.00254 seconds

Problem:

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

→ Solution:

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

Tim::
Nodes Visited: 81 **Time:** 0.00182 seconds

Problem:

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

→ Solution:

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

Colton::

Nodes Visited: 81 **Time:** 0.00176 seconds

Problem $\rightarrow$ Solution

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

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

Ayla::

Nodes Visited: 81 **Time:** 0.00182 seconds

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

$\rightarrow$

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

Reece::
Nodes Visited: 81 **Time:** 0.00221 seconds

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

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

Austin::
Nodes Visited: 83 **Time:** 0.01218 seconds

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

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

13

AlsoTim::
Nodes Visited: 4744 **Time:** 0.18007 seconds

Problem → Solution

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

Michael::
Nodes Visited: 87 **Time:** 0.00433 seconds

Problem → Solution

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

Graeme::
Nodes Visited: 451 **Time:** 0.02131 seconds

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

→

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

Ryley::
Nodes Visited: 6859 **Time:** 0.26505 seconds

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

→

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

AlsoRyley::
Nodes Visited: 81 **Time:** 0.01323 seconds

Problem		Solution

Problem:
```
|| | | || | | || | | ||
|| | | || | | || | | ||
|| | | || | | || | | ||
|| | | || | | || | | ||
|| | | || | | || | | ||   →
|| | | || | | || | | ||
|| | | || | | || | | ||
|| | | || | | || | | ||
|| | | || | | || | | ||
```

Solution:
```
|| 1 | 2 | 3 || 4 | 5 | 6 || 7 | 8 | 9 ||
|| 4 | 5 | 6 || 7 | 8 | 9 || 1 | 2 | 3 ||
|| 7 | 8 | 9 || 1 | 2 | 3 || 4 | 5 | 6 ||
|| 2 | 3 | 1 || 8 | 7 | 5 || 6 | 9 | 4 ||
|| 6 | 7 | 4 || 9 | 1 | 2 || 5 | 3 | 8 ||
|| 8 | 9 | 5 || 3 | 6 | 4 || 2 | 1 | 7 ||
|| 3 | 4 | 2 || 5 | 9 | 7 || 8 | 6 | 1 ||
|| 5 | 1 | 7 || 6 | 3 | 8 || 9 | 4 | 2 ||
|| 9 | 6 | 8 || 2 | 4 | 1 || 3 | 7 | 5 ||
```

Me::
Nodes Visited: 93 **Time:** 0.01308 seconds

Problem:
```
|| | | 1 || | | || | | 2 ||
|| | | || 9 | | || | | ||
|| | 5 | || | | || | | ||
|| 7 | | || | | || 3 | | ||
|| | | || | | || | | 6 ||    →
|| | | || | | 4 || | | ||
|| | | 4 || | | || | 2 | ||
|| | | || 7 | | || | | ||
|| 8 | | || | | || | 3 | 5 ||
```

Solution:
```
|| 3 | 8 | 1 || 5 | 4 | 6 || 7 | 9 | 2 ||
|| 2 | 7 | 6 || 9 | 1 | 3 || 5 | 8 | 4 ||
|| 4 | 5 | 9 || 7 | 2 | 8 || 1 | 6 | 3 ||
|| 7 | 9 | 2 || 6 | 8 | 5 || 3 | 4 | 1 ||
|| 1 | 4 | 3 || 2 | 9 | 7 || 8 | 5 | 6 ||
|| 5 | 6 | 8 || 1 | 3 | 4 || 2 | 7 | 9 ||
|| 9 | 3 | 4 || 8 | 5 | 1 || 6 | 2 | 7 ||
|| 6 | 2 | 5 || 3 | 7 | 9 || 4 | 1 | 8 ||
|| 8 | 1 | 7 || 4 | 6 | 2 || 9 | 3 | 5 ||
```