CSCI 3901

Software Development Concepts

Faculty of Computer Science

Problem 1: "Write test cases for Alice's Sudoku class"

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Table Category Description

Test ID

- Serial number for each test case

Test Scenario

- What is been tested

Test Case

- Type of parameter i.e. valid or invalid is passed to the case

Pre-Condition

- Conditions on which the passed parameters will be validated

Test Steps (Ascending)

- Order in which Module will be tested.
- In other words, order in methods will be executed

User Input

- Passed value to the parameters

Actual Result

- Result of the test case based on the user input

Additional Comments

- Describes why did the test case failed or succeeded.
- And which preconditions were validated.

Status

- P A S S – it indicates that the test case has behaved in the expected manner and yields desirable result.
- F A I L – it indicates that the passed parameter of test case has violated the preconditions or any other error occurred.

MODULE TESTED:

Sodoku (int size)

Test ID	Test Scenario	Test Case	Pre Condition	Test Steps (Method)	User Input	Actual Result	Additional Comments	Status
TC_01	Verify **size** parameter	Enter valid size	Need integer value in range (1 & n^2)	Sudoku (size)	size= 3	Returns True	Size can be any positive value	**PASS**
TC_03	Verify **size** parameter	Enter valid size	Need integer value in range (1 & n^2)	Sudoku (size)	size= -34	Returns False	Size can't be negative value	**FAIL**
TC_04	Verify **size** parameter	Enter valid size	Need integer value in range (1 & n^2)	Sudoku (size)	size= null	Returns False	Size can't be NULL	**FAIL**
TC_05	Verify **size** parameter	Enter valid size	Need integer value in range (1 & n^2)	Sudoku (size)	size= 0	Returns False	Size cannot take zero as value as grid 0 x	**FAIL**
TC_06	Verify **size** parameter	Enter valid size	Need integer value in range (1 & n^2)	Sudoku (size)	size = 2147483647	Returns True	Boundary Case	**PASS**
TC_07	Verify **size** parameter	Enter valid size	Need integer value in range (1 & n^2)	Sudoku (size)	size= "13"	Returns False	Size can't be a string value even if it's an integer	**FAIL**

MODULE TESTED:

1. Sodoku (int size)
2. SetPossibleValues(values)

Test ID	Test Scenario	Test Case	Pre-Condition	Test Steps (Method)	User Input	Actual Result	Additional Comments	Status
TC_01	1. n^2 x n^2 grid is generated by Sudoku(n) 2. generated value String of size (n^2)	Enter valid number of character values	No. of character should be **size²** and each unique character should be of String type	Sudoku(size) setPossibleValues (Values)	size= 3 values=" a b c d e f g s w "	Returns True	Size can be any positive value parameter has size² unique characters	**PASS**
TC_02	1. n^2 x n^2 grid is generated by Sudoku(n) 2. generated value String of size (n^2)	Enter valid number of integer values	No. of character should be **size²** and each unique character should be of String type	Sudoku(size) setPossibleValues (Values)	size= 3 values=" 3 2 6 1 7 4 5 8 9 "	Returns True	Size can be any positive value parameter has size² unique integer characters	**PASS**
TC_03	1. n^2 x n^2 grid is generated by Sudoku(n) 2. generated value String of size (n^2)	Enter valid number of integer + String values	No. of character should be **size²** and each unique character should be of String type	Sudoku(size) setPossibleValues (Values)	size= 3 values=" e w 6 a 7 x 5 y 9 "	Returns True	Size can be any positive value parameter has size² unique integer and string characters	**PASS**
TC_03	1. n^2 x n^2 grid is generated by Sudoku(n) 2. generated value String of size (n^2)	Enter valid number of integer + String values	No. of character should be **size²** and each unique character should be of String type	Sudoku(size) setPossibleValues (Values)	size= 3 values=" e w 6 a 7 x 5 y 9 "	Returns True	Size can be any positive value parameter has size² unique integer and string characters	**PASS**
TC_04	1. n^2 x n^2 grid is generated by Sudoku(n) 2. generated value String of size (n^2)	Enter invalid number of String values	No. of character should be **size²** and each unique character should be of String type	Sudoku(size) setPossibleValues (Values)	size= 3 values=" e 6 a 7 x y 9 "	Returns False	Size can be any positive value number of unique characters is less than size²	**FAIL**

TC_05	1. n^2 x n^2 grid is generated by Sudoku(n) 2. generated value String of size (n^2)	Enter invalid number of String values	No. of character should be **size²** and each unique character should be of String type	Sudoku(size) setPossibleValues (Values)	size= 3 values=" e w 6 8 a 7 x t 5 y 9 "	Returns False	Size can be any positive value number of unique characters is more than size²	**FAIL**
TC_06	1. n^2 x n^2 grid is generated by Sudoku(n) 2. generated value String of size (n^2)	Enter invalid number of String values	No. of character should be **size²** and each unique character should be of String type	Sudoku(size) setPossibleValues (Values)	size= 3 values=" "	Returns False	Size can be any positive value value parameter can't be null or empty string	**FAIL**
TC_07	1. n^2 x n^2 grid is generated by Sudoku(n) 2. generated value String of size (n^2)	Pass Null / Empty String	No. of character should be **size²** and each unique character should be of String type	Sudoku(size) setPossibleValues (Values)	size= 3 values=" "	Returns False	Size can be any positive value value parameter can't be null or empty string	**FAIL**
TC_07	1. n^2 x n^2 grid is generated by Sudoku(n) 2. generated value String of size (n^2)	Enter duplicate String values	No. of character should be **size²** and each unique character should be of String type	Sudoku(size) setPossibleValues (Values)	size= 3 values=" w w 6 a a x t b b g "	Returns False	Size can be any positive value No character must be repeated more than once.	**FAIL**

MODULE TESTED:

1. Sodoku (int size)
2. SetPossibleValues(values)
3. SetCellValue(x,y,letter)

Test ID	Test Scenario	Test Case	Pre-Condition	Test Steps (Method)	User Input	Actual Result	Additional Comments	Status
TC_001	1. n^2 x n^2 grid is generated by Sudoku(n) 2. generated value set of size (n^2) 3. set value of an empty cell	valid size	integer size in range (1 to n^2)	Sodoku (size)	size=3	Returns True		PASS
		valid x value	integer x in range (1 to size^2)	SetPossibleValues(values)	**value**={1 to 9}	Returns True	no .of values are (size ^{2})	
		valid y value	integer y in range (1 to size^2)	SetCellValue(x,y,letter)	x=3 | y=4	Returns True	value of x,y are in range (1 , size ^{2})	
		valid letter value	letter should be in value set		letter=5		letter value is from **value** set	
TC_002	1. n^2 x n^2 grid is generated by Sudoku(n) 2. generated value set of size (n^2) 3. set value of an empty cell	valid size	integer size in range (1 to n^2)	Sodoku (size)	size=4	Returns True	Value of x is out of range (1 , size ^{2})	FAIL
		invalid x value	integer x in range (1 to size^2)	SetPossibleValues(values)	**value**={1 to 16}	Returns True		
		valid y value	integer y in range (1 to size^2)	SetCellValue(x,y,letter)	x=19 | y=14	Returns False		
		valid letter value	letter should be in value set		letter=9			
TC_003	1. n^2 x n^2 grid is generated by Sudoku(n) 2. generated value set of size (n^2) 3. set value of an empty cell	valid size	integer size in range (1 to n^2)	Sodoku (size)	size=4	Returns True	Value of y is out of range (1 , size ^{2})	FAIL
		valid x value	integer x in range (1 to size^2)	SetPossibleValues(values)	**value**={A to P}	Returns True		
		invalid y value	integer y in range (1 to size^2)	SetCellValue(x,y,letter)	x=4 | y=23	Returns False		
		valid letter value	letter should be in value set		letter=K			
TC_004	1. n^2 x n^2 grid is generated by Sudoku(n) 2. generated value set of size (n^2) 3. set value of an empty cell	valid size	integer size in range (1 to n^2)	Sodoku (size)	size=6	Returns True	letter is out of value set range (1 , 36)	FAIL
		valid x value	integer x in range (1 to size^2)	SetPossibleValues(values)	**value**={1 to 36}	Returns True		
		valid y value	integer y in range (1 to size^2)	SetCellValue(x,y,letter)	x=4 | y=23	Returns False		
		invalid letter value	letter should be in value set		letter=37			
TC_005	1. n^2 x n^2 grid is generated by Sudoku(n) 2. generated value set of size (n^2) 3. set value of an empty cell	valid size	integer size in range (1 to n^2)	Sodoku (size)	size=3	Returns True	Value of x & y is out of range (1 , size ^{2})	FAIL
		invalid x value	integer x in range (1 to size^2)	SetPossibleValues(values)	**value**={1 to 9}	Returns True		
		invalid y value	integer y in range (1 to size^2)	SetCellValue(x,y,letter)	x=14 | y=12	Returns False		
		valid letter value	letter should be in value set		letter=6			
TC_006	1. n^2 x n^2 grid is generated by Sudoku(n) 2. generated value set of size (n^2) 3. set value of an empty cell	valid size	integer size in range (1 to n^2)	Sodoku (size)	size=3	Returns True	x & y can't accept NULL values	FAIL
		null x value	integer x in range (1 to size^2)	SetPossibleValues(values)	**value**={1 to 9}	Returns True		
		null y value	integer y in range (1 to size^2)	SetCellValue(x,y,letter)	x=NULL | y=NULL	Returns False		
		valid letter value	letter should be in value set		letter=6			
TC_007	1. n^2 x n^2 grid is generated by Sudoku(n) 2. generated value set of	valid size	integer size in range (1 to n^2)	Sodoku (size)	size=3	Returns True	letter can't accept NULL values	FAIL
		valid x value	integer x in range (1 to size^2)	SetPossibleValues(values)	**value**={1 to 9}	Returns True		
		valid y value	integer y in range (1 to size^2)	SetCellValue(x,y,letter)	x=2 | y=1	Returns False		

	size (n^2)	null letter value	letter should be in value set	SetCellValue(x,y,letter)	letter=NULL	Returns False		
	3. set value of an empty cell							
TC_008	1. n^2 x n^2 grid is generated by Sudoku(n) 2. generated value set of size (n^2) 3. set value of an empty cell	valid size	integer size in range (1 to n^2)	Sodoku (size)	size=3	Returns True	x & y ara passed correct values but not as integer but string which is not allowed	**FAIL**
		x =String value	integer x in range (1 to size^2)	SetPossibleValues(values)	**value**={1 to 9}	Returns True		
		y=String value	integer y in range (1 to size^2)	SetCellValue(x,y,letter)	x="2" y="1"	Returns False		
		valid letter value	letter should be in value set		letter=7			
TC_009	1. n^2 x n^2 grid is generated by Sudoku(n) 2. generated value set of size (n^2) 3. set value of an empty cell	valid size	integer size in range (1 to n^2)	Sodoku (size)	size=4	Returns True	this is a boundary case where x, y and letter are not within their respective ranges	**FAIL**
		invalid x value	integer x in range (1 to size^2)	SetPossibleValues(values)	**value**={A to P}	Returns True		
		invalid y value	integer y in range (1 to size^2)	SetCellValue(x,y,letter)	x=34 y=20	Returns False		
		invalid letter value	letter should be in value set		letter=Z			

MODULE TESTED :

1. Sodoku (int size)
2. SetPossibleValues(values)
3. SetCellValue(x,y,letter)
4. Solve()

Test ID	Test Scenario	Test Case	Pre Condition	Test Steps (Method)	User Input	Actual Result	Additional Comments	Status
TC_01	1. n^2 x n^2 grid is made by Sudoku(n) 2. generated value set of size (n^2) 3. set value of empty cell 4. Call Solve() to solve sudoku	valid size	integer size in range (1 to n^2)	Sudoku (size)	size=3	Return True	Size can be any positive value	PASS
		valid **values** String	No. of unique character = size^2	SetPossibleValues (values)	**value**= {a to i}	Return True	no .of values are (size ^{2})	
		valid **x,y** value	integer x,y in range (1 to size^2)	SetCellValue (x,y,letter)	x=3 y=4	Return True	x,y, letter are validated	
		valid **letter** value	letter should be in value set		letter= f			
				Solve()	No i/p	Return True	sudoku will be solved	
TC_02	1. n^2 x n^2 grid is made by Sudoku(n) 2. generated value set of size (n^2) 3. set value of empty cell 4. Call Solve() to solve sudoku	valid size	integer size in range (1 to n^2)	Sudoku (size)	size=3	Return True	Size can be any positive value	FAIL
		valid **values** String	No. of unique character = size^2	SetPossibleValues (values)	**value**= {a to i}	Return True	no .of values are (size ^{2})	
		valid **x,y** value	integer x,y in range (1 to size^2)	SetCellValue (x,y,letter)	x=3 y=4	Return True	x,y, letter are validated	
		valid **letter** value	letter should be in value set		letter= f		sudoku will not be solved as no possible solution found	
				Solve()	No i/p	Return False		

NOTE:

1. Here, TC_02 is only one of the best case where every method was executed successfully but Solve() method return False as no possible solutions was found.
2. It's worth noting that there will be cases where Solve() will return False when one of the previous executable method (Sudoku(size), SetPossibleValues(values),SetCellValue(x,y,letter)) also return False.

MODULE TESTED :

1. Sodoku (int size)
2. SetPossibleValues(values)
3. SetCellValue(x,y,letter)
4. Solve()

Test ID	Test Scenario	Test Case	Pre Condition	Test Steps (Method)	User Input	Actual Result	Additional Comments	Status
TC_01	1. n^2 x n^2 grid is made by Sudoku(n) 2. generated value set of size (n^2) 3. set value of empty cell 4. Call Solve() to solve sudoku 5. Call toPrintString()	valid size	integer size in range (1 to n^2)	Sudoku (size)	size=3	Return True	Size can be any positive value	PASS
		valid **values** String	No. of unique character = size^2	SetPossibleValues (values)	**value**= {a to i}	Return True	no .of values are (size ^{2})	
		valid **x,y** value	integer x,y in range (1 to size^2)	SetCellValue (x,y,letter)	x=3,y=4	Return True	x,y, letter are validated	
		valid **letter** value	letter should be in value set	Solve()	letter= f No i/p	Return True	sudoku will be solved	
		valid emptyCellLetter	emptyCellLetter is of char data type	toPrintString()	X' or 'O'	Return True	Return multi line Strings	
TC_02	1. n^2 x n^2 grid is made by Sudoku(n) 2.Call toPrintString() 3. set value of empty cell 4. Call Solve() to solve sudoku	valid size	integer size in range (1 to n^2)	Sudoku (size)	size=3	Return True	Size can be any positive value	FAIL
		valid emptyCellLetter	emptyCellLetter is of char data type	toPrintString()	X' or 'O'	Return False	This method retun false its called before executing setpossiblevalues() , SetCellValue(), Solve()	
TC_03	2.Call toPrintString() 3. set value of empty cell 4. Call Solve() to solve sudoku	valid emptyCellLetter	emptyCellLetter is of char data type	toPrintString()	X' or 'O'	Return False	This method retun false its called before executing Sudoku()	FAIL
		valid size	integer size in range (1 to n^2)	Sodoku (size)	size=3	Return False	Size can be any positive value	

NOTE:

1. Here, another case of TC_01 is that Solve() method returns False and still it will run toPrintString() and print the Sudoku.
2. Similar to TC_02, its possible that toPrintString() will be called after successfully executing SetPossiblevalues, also after SetCellValues() and still it will return False as the correct order of calling this method is (Sudoku -> SetPossibleValues->SetCellValues -> Solve -> toPrintString)