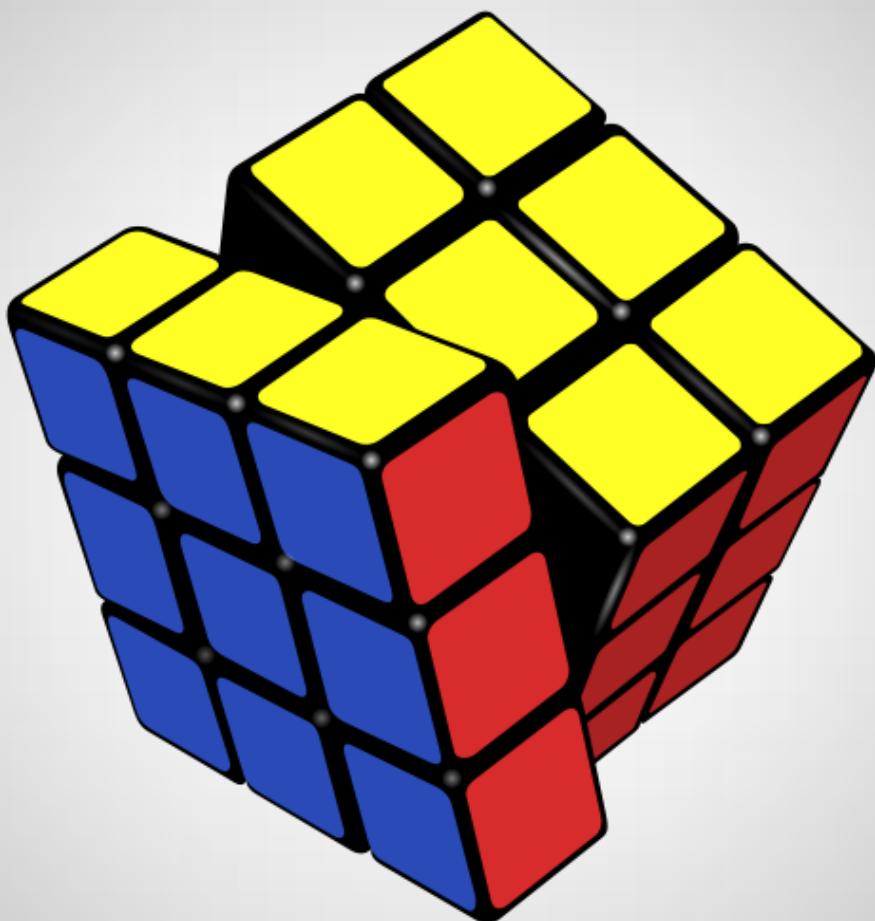


SECTION 3

TESTING



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Pre-existing Data

I am going to fill the database with the following data before testing.

Preferences

Real-time solving speed (ms)	125
Inspection time (seconds)	15
Show Click-to-Solve warning	Yes
Scramble text size	25

Algorithm Table

ID	Algorithm	Comment
1	R U R' U'	Fast move (uneditable)
2	R' F R F'	Sledgehammer (uneditable)
3	R U R' U R U2 R'	Sune (uneditable)
4	F R' F' R	Hedgeslammer
5	R U' L' U R' U' L	Niklas

Member Table

ID	Forenames	Surname	Gender	Date of Birth	Email	Form Class
1	Ryan Charles	Jones	Male	24/01/2002	rjones@gmail.com	8W
2	Thomas	Smith	Male	13/12/1998	tsmith@hotmail.com	11M
3	Jack	Cooper	Male	22/05/2001	jcooper@hotmail.com	9S
4	Lee	Brown	Male	18/01/1998	lbrown@gmail.com	12R
5	Joy	Montgomery	Female	22/10/2000	jmontgomery@gmail.com	9S
7	Lily	Green	Female	14/02/1996	lgreen@yahoo.com	14T
8	William	Johnston	Male	12/03/2000	wjohnston@gmail.com	10S
9	Simon	Lane	Male	05/09/1995	slane@gmail.com	14R
11	Hannah	Laverty	Female	21/04/1996	hlaverty@hotmail.com	14M
12	Sarah	Rutherford	Female	28/11/1996	srutherford@gmail.com	13M
13	Sam	Middleton	Male	10/09/1999	smiddleton@gmail.com	10W

Competition Table

ID	Date
1	02/10/2013
2	16/10/2013
3	13/11/2013
4	27/11/2013
5	11/12/2013
6	8/1/2014
7	22/01/2014

Solve Table

ID	Time	Penalty	Comment	Scramble	Solution	Date Added
1	18.81	0		U B' F' L' R2 U2 F' D B2 R' U F D2 F U L2 B R2 U2 F' B' D2 U B' F'	x2 y' R2 M2 U2 M2 y' U' L' U L R' U R y' U R' U R y' U R U R' U2 R U' R' y' R U R' U R U' R' U' R w y R U R' U' R U R' U' y' R w' L' U R' D2 R U' R' D2 R L U	2014-03-08 20:33:16
2	16.37	0	PLL Skip	D' F D' R D U L2 U B' F D F D2 F2 D R' F2 U' F2 R2 D L B2 F U'	x2 y2 F D2 U2 R' F R2 y' D' L D R U R' y' U' R' U' R U2 R' U R U' R U' R' U R U' R' y2 U2 y' R' U R U' R' U R U' R U R U2 R' F R U R' U' F' U2	2014-03-08 20:33:16
3	18.44	0		U' D2 R2 L' U' F2 B L D R D' B L U' R2 L B' D R' L D' L' B2 L2 U	x2 U' R' F B' R2 L2 D U' R' U R L' U L y2 U2 R U' R' U2 R U' R' y' U y' R' U' R U2 R L' U L R' y' U' R' U' R U2 Lw' U' L U' L U' L' U2 Lw R2 U R U R' U' R' U' R' U R' U2 R U R' F' R U R' U' R' F R2 U' R' U2	2014-03-08 20:33:16
4	17.75	0		L' D' U' F D2 U2 B R2 D' F2 B R L2 D2 L' F2 U2 R' B U F' L2 F2 L2 F	y x2 y2 D L R F R2 D L2 y U R' U R U L' U L U' L' U' L y2 U' R U' R' U' y R' U R y' R U2 R' U y' R' U' R U R' U' F U R U' R' F' R U F' L' U' L' U L' U' L U F R2 U R U R' U' R' U' R' U' R' U' L' R' D2 R U R' D2 R U' L' U'	2014-03-08 20:33:16
5	17.33	0		R2 B' F2 R' B2 R' U F' U2 B2 F U' R' B2 L' D2 B2 D' B2 U' F' B' L2 R' U	x2 D' R' B' D' y' L U L F' R' U R U' R' U' R y' U R U' R' U' R U2 R U R' U R U' R' y2 R U' R' U2 R U' R' U2 Lw' U' Lw L' U' L U Lw' U' Lw R2 U R U R' U' R' U' R' U R2 U L' U2 R U' R' U2 L' R U	2014-03-08 20:33:16
6	31.11	0		B' F L' D2 L2 U' L2 B U D2 L' B R' F' B2 L' F D L2 B F D B R2 L'	x2 y' D' R F y' D F y L F' L' U2 R' U' R y' U R' U' R' U' R y' U R U' R' y' U2 y' R U R' y' U' L' U L U R U R' U F R U R' U' F' y F R U F R' U' F' U M' U2 M U R' y' R' U R U' R' U' R y2 U R U' R' y L' R' L R L' U L U' L' U' L U' L' U L U L F' L' F R U' R U R U R' U' R U' R2 U2	2014-03-08 20:33:16
7	19.29	0		F2 R' U' L2 U' B R U F' L2 D F' U2 F' U' D' R' D2 F' D' L2 D F' U D'	x2 y2 D R2 D2 R2 F' y' R U R2 U' R2 U' R' U' y' R U' R' y' U2 R U' R' U' R U R' y2 R U R' U' L U' L U R U R' U2 R U' R2 F R F' U' R w U R' U R U' R' U R U2 R w' U' F R U' R' U' R' U R U' F' R U R' U' R' F R F'	2014-03-08 20:33:16
8	12.29	0	Easy	F B' R2 U2 B F D B2 F2 D B' D2 F' U2 R' B2 R' F R2 L' B2 F2 L2 U R	y' x2 R' F2 D2 y' R' U' R' L' U L y2 U' R U2 R' U' R U R' y' U R U R' y' U2 y' R' U R U' R' U R F' U' L' U L F U L U2 L' U2 L F' L' U' L U L F L2	2014-03-08 20:33:16

ID	Time	Penalty	Comment	Scramble	Solution	Date Added
9	12.19	0		L' D' U2 R U' D L2 R U' L' U' L D2 B2 D' B' R2 B2 F D2 R2 D' R2 D2 F	x2 U' L2 R' U R' F y' R U' R' y' U2 R' U' R U2 L' U' L U' R U2 R' y U' R' U' R y' U2 y' R' U2 R U' R' U R U M' U M U2 M' U M U2 R U' R U R U R' U' R' U' R2 U'	2014-03-08 20:33:16
10	20.40	0	Bad cross	F' R D R U2 L2 F' L' B' F' U' B' U2 F2 R2 L D' U F' R D2 L' B2 D B	x2 y' D R' B' R' y' U' R' F U R y U R' U R U2 R U2 R' U' R U R' y' U y' R' U' R U' y' L' U L U2 R U' R' U R U R' U' R U R' U' y' R w y R U R' U' y' R w' F R U R' U' F' U' R2 U R U R' U' R' U' R' U R' U2 L' R' D2 R U' R' D2 R U' L	2014-03-08 20:33:16
11	14.46	0		D F' D2 R2 F' R' F' D' U L2 B' L2 U2 F2 U2 B2 R' U' D R L' B R' D R2	y x2 y D U R' F L B2 D' R U' R' y R' U' R y2 U R U' R' U y R U' R' y' U' y R' U' R L' U L U y U' y' R' U R U R U R' U' R' F R F' U2 R' F R F' U2 L' R' D2 R U R' D2 R U' L U'	2014-03-08 20:33:16
12	15.31	0		L2 U2 R L' F2 U B' R2 F D2 L2 F' B U2 L2 D R2 U F2 D2 R2 U' L2 R B2	x2 D' R2 y' R' U R' F y' U2 R' U' R U' y' R U' R' y' U2 R U' R' U2 R U' R' y' U2 y' R' U R U' R' U' R2 U2 R' U2 R U' R' U' R' U' R' U2 R U2 L U2 L' U2 L F' L' U' L U L F L2 U2	2014-03-08 20:33:16
13	16.43	0		U' F D U' R' U' F' B' R2 U' F B D' L' F L' R2 B' L' D' U B L' R B'	x2 y' B U' R' F U L2 U R U' R' U y' L' U L y R U2 R' U R U' R' y R U' R' U' y' R' U R y' U R U' R' U2 y' R' U' R U2 R' F R F' R F R' U R R' U' R U R' U R2 U R U R' U' R' U' R2 U L' U2 R U' R' U2 L R	2014-03-08 20:33:16
14	19.50	0		B R' B L' R' D2 F R' B' D' R L2 F B D2 F U' R' F2 R' F B2 D' U R2	y' x2 y D L R' U' R' F D2 y2 U' R U' R' U y R U' R' y2 U2 R U2 R' U' R' y' U y R U' R U' R' U y' R' U' R y' R' U R y' U R U' R' U' y' L' U L U' F R U R' U' F' U' Lw' U' L U' L' U2 Lw U2 R' U L' U2 R U' R' U2 L R	2014-03-08 20:33:16
15	17.01	0		L2 U R' D2 U2 F' U2 R' B2 L' R2 U B2 R2 D' U' R2 U' B2 L2 D' F2 B2 D' B	x2 L F' D' R D' R D2 y' U' y' R U' R' y' U R U R' U' R U R' U' R U R' U' R' U R y U' R U R' y R U' R' U' y' L' U L U y' R' U' R U R' U' R U R' U' R U R' U2 R2 U' R U' R' U2 R U R' U' F' R U R' U' R' F R2 U' R' U' R U R' U R U2	2014-03-08 20:33:16
26	14.36	0		L' R2 D F2 R' D' F2 R U F U' B F2 U' D2 B U' F' D B F' R2 D' B D	x2 y L U R' F B' y' U' R' U R y U' R U' R' y' U2 R U R' U' R U R' U' R U' R' y2 U R' U2 R U2 R' U R U F' R U R' U' R' F R U' F' L' U' L U' U' L U F U' R2 U R U R' U' R' U' R' U R2 U L' U2 R U' R' U2 L R	2014-03-08 20:50:51

Member Competition Table

Competition ID	Member ID	Time 1	Time 2	Time 3	Time 4	Time 5
1	1	20.27	21.30	21.22	19.58	18.49
1	2	16.42	16.51	16.89	20.56	16.10
1	4	35.40	32.16	38.90	40.20	41.70
1	5	25.14	26.28	25.64	25.66	25.13
1	7	13.25	13.64	13.02	13.28	12.56
1	9	40.78	45.25	36.29	38.51	42.70
1	11	16.52	16.78	16.42	16.31	16.00
1	12	19.81	19.42	18.63	19.55	26.31
2	2	16.55	17.81	15.66	16.43	16.89
2	3	11.31	11.26	11.09	12.60	10.97
2	4	35.42	36.29	33.20	37.89	34.28
2	13	1:09.46	1:13.50	1:20.34	1:04.69	1:10.19
3	5	24.80	21.66	22.49	22.37	22.15
3	7	13.77	13.01	14.06	12.89	13.46
3	11	15.87	15.36	15.99	16.50	16.42
4	1	19.82	18.96	19.53	19.20	20.34
4	2	15.42	15.37	15.13	15.90	14.85
4	13	55.60	52.67	1:04.51	59.84	55.09
5	5	22.67	22.42	22.19	21.56	24.90
5	9	37.85	37.16	38.12	39.61	35.33
5	12	19.20	19.42	19.36	20.59	18.77
6	2	15.13	15.83	16.28	15.47	15.01
6	7	12.99	12.82	13.56	16.96	12.85
6	11	15.30	15.87	15.69	15.10	15.36
7	1	18.56	18.51	18.69	18.10	17.48
7	2	14.88	14.26	14.40	14.86	14.78
7	4	32.85	34.43	29.58	36.52	29.60

Test Plan

Test Series	Purpose of Test Series
1	Test control flow (top-down testing). Test if the menu items and buttons go to the correct part of the system.
2	Test data validation (bottom-up testing). Test if the data input by the user is accepted or rejected appropriately.
3	Test sorting, calculations etc. (white-box testing). Test if selections and iterations carried out correctly with accurate results for calculations.
4	Test saving of data (system testing). Test if the specified data is updated in the corresponding tables, files, or in-program lists.
5	Test whether or not results of background processes are displayed correctly to user (black-box testing).

All tests were successful unless otherwise specified.

Test Series 1

Main Window → Menu Functionality

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
1.01	Click 'Exit' menu item.	The program should close.	-	-
1.02	Click 'Show Time Graph' menu item.	A new window should open showing the time graph.	-	-
1.03	Click 'Show Current Scramble' checkbox menu item.	The scramble shown at the top of the window should be hidden.	If the box is checked, the text 'Scramble: ...' should be shown at the top of the window, otherwise it should not be shown.	-
1.04	Click 'Show Scramble List' menu item.	The 'Scramble List' window should be shown, displaying the scrambles currently stored.	-	-
1.05	Click 'Show Algorithm Table' menu item.	The 'Algorithm Table' window should be shown, displaying the algorithms stored in the database.	-	-
1.06	Click 'Show Solve Table' menu item.	The 'Solve Table' window should be shown, displaying the solves stored in the database.	-	-
1.07	Click 'Show Statistics' menu item.	The text area at the bottom of the screen should show the statistics.	This feature is vital since the text area can show other information, such as the moves required to solve the cube and text for a tutorial.	-
1.08	Click 'Show Competition Table' menu item.	The 'Competition Table' window should be shown, displaying the competitions stored in the database.	-	-
1.09	Click 'Show Member Table' menu item.	The 'Member Table' window should be shown, displaying the members stored in the database.	-	-
1.10	Click 'Preferences' menu item.	The 'Preferences' window should be shown, displaying the current preferences for the program.	-	-

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
1.11	Click 'Paint Custom State' checkbox menu item.	The 'Color Selection' window should open.	If the box is checked, the color selection window should be shown. If it is not checked, then the color selection window should be hidden.	3.01
1.12	Click 'Corners Introduction' menu item.	The program should switch to tutorial mode, the 'corners introduction' tutorial should be loaded, and the starting text should be shown in the text area.	The only visual aspect of the program that changes when switching from 'tutorial mode' to 'timing mode', or vice-versa, is the scramble text and the button/text area at the bottom.	3.02
1.13	Click 'Exit Tutorial' menu item.	The program should switch to timing mode.	-	3.03
1.14	Click 'Add Solve' menu item.	The 'Solve Editor' form should be shown, allowing the user to enter information about the solve. The default values in the form should be ("DNF", 0, "**", "", ""). An item should be added to the time list with the text 'DNF'.	-	3.04
1.15	Click 'Edit Selected Solve' menu item.	Typical: an item in the list has been selected	-	3.05
		The 'Solve Editor' form should be shown with the data for that solve displayed in the form.		
		Erroneous: no item has been selected	-	3.06
		A message should be shown informing the user that no item in the list has been selected.		

Main Window (Timing Mode)

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
1.16	Double-click a listed time.	The 'Solve Editor' form should be shown with the data for that solve displayed in the form.	If there are no solves listed, then nothing should happen (and the program should not crash).	-

Main Window (Tutorial Mode)

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
1.17	Click 'Description' button.	The description for the current sub-tutorial should be shown.	-	3.07
1.18.1	Click 'Hint' button.	The next hint for the current sub-tutorial should be shown.	If there are no hints then the button will be greyed out. UNSUCCESSFUL When the last hint was loaded and the button is clicked again, an exception was thrown and the stack trace was printed in the console because the $(last + 1)^{th}$ element was trying to be accessed. See test index 1.18.2 for re-test and see the <i>Corrective Action</i> section for altered code.	-
1.18.2	Click 'Hint' button.	The next hint for the current sub-tutorial should be shown.	If there are no hints then the button will be greyed out. SUCCESSFUL	3.08

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
1.19	Click 'Reset' button.	The cube should be reset to its original state for the current sub-tutorial.	If the user made a mistake, or wishes to start the task again, resetting the cube is the best option. If the cube started off in state <i>a</i> , then the user does moves which puts the cube in state <i>b</i> , then clicking the reset button will put the cube back in state <i>a</i> . All recorded moves will be cleared.	3.09
1.20	Click 'Solution' button.	The solution for the current sub-tutorial should be shown.	If there is no solution, this button will be greyed out.	3.10
1.21	Click 'Back' button.	The program should load the previous sub-tutorial and show the description for that sub-tutorial.	If the user is on the first sub-tutorial, then this button will be greyed out since they cannot go back to a previous sub-tutorial.	3.11
1.22	Click 'Next' button.	The next sub-tutorial should be loaded and the description for that sub-tutorial should be shown.	The button should be greyed out when the last sub-tutorial is loaded.	3.12

Scramble List

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
1.23	Double-click on an item in the list.	This should have the same effect as selecting a cell and clicking the 'Edit Scramble' button.	-	-
1.24	Click 'Edit Scramble' button.	An input window should be shown, populated with the selected scramble's text.	If there are no items in the list or no items are selected, nothing should happen.	3.13

Time Graph

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
1.25	Click 'Close Window' menu item.	The time graph window should close.	-	-

Algorithm Table

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
1.26	Double-click on a cell.	The user should be able to edit the text of the selected cell after double-clicking.	-	-

Solve Table

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
1.27	Click 'Add Solve' button.	The 'Solve Form' window should be shown, allowing the user to input information about the solve.	-	3.14
1.28	Click 'Edit Solve' button.	The 'Solve' form should be shown, displaying the information about the selected solve.	If nothing is selected, then nothing should happen.	3.15
1.29	Double-click on a row.	This should have the same effect as selecting a row, then clicking the 'Edit Solve' button.	-	-

Member Table

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
1.30	Click 'Add Member' button.	The 'Member Form' window should open, allowing the user to enter information about a new member.	-	3.16
1.31	Click 'Edit Member' button.	The 'Member Form' window should open, displaying the information about the selected member.	If nothing is selected, then nothing should happen.	3.17
1.32	Double-click a cell.	This should have the same effect as selecting a row then clicking the 'Edit Member' button.	-	-

Competition Table

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
1.33	Click the 'View Rankings' button.	The times stored for each member in that competition should be shown in the 'Member-Competition Table' window. The rows should be sorted by the calculated 'average of five'.	-	3.18
1.34	Click the 'Edit Competition' button on a competition with no assigned date.	An input window should be shown with the text 'dd/MM/YYYY', allowing the user to enter a date.	If the competition already has a date, then this date will be shown in the input window rather than 'dd/MM/YYYY'.	3.19

Member-Competition Table

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
1.35	Click 'Add' button.	The 'Member-Competition Form' window should be shown, allowing the user to enter information about a new record	If there are no remaining members for whom data can be entered, then an error message with the text "No existing members remaining" should be shown.	3.20
1.36	Click 'Edit' button.	The 'Member-Competition Form' window should be shown, displaying the information about the selected record.	If the selected row contains information about a past member (whose information is no longer stored), then an error message should be shown with the text, "This member no longer exists".	3.21

Test Series 2

Solve Editor Form

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
2.01	Click 'Submit' button with test data in form.	<p>The data entered in the form should be submitted for validation.</p> <p>Typical: 18.86 0 * U R U' R' R U R' U'</p>	-	-
		<p>The information should be submitted and the corresponding item in the list should be updated with this information.</p>	<p>The time is in the correct format (SS.ss), so all data should be accepted no matter what the penalty, comment, scramble, or solution fields contain, since no validation needs to be run on these data.</p>	3.22
		<p>Erroneous: *90 2 My comment My scramble My solution</p>	<p>The *90 is obviously erroneous since it contains an illegal character (*), and it does not contain a decimal point, so this input should be rejected.</p>	3.23
		<p>An error message should be shown with the text: "You entered the time incorrectly Valid formats include: MM:SS.ss MM:S.ss M:SS.ss M:S.ss SS.ss S.ss DNF"</p>		

	<p>Boundary: -1.0 0 My comment My scramble My solution</p> <p>The same error message as above should be shown.</p>	The time field contains an illegal character (-), so data should be rejected.	3.24
	<p>Boundary: 100.0 0 My comment My scramble My solution</p> <p>The same error message as above should be shown.</p>	This input has the form SSS.s, which is not valid, so it should be rejected.	3.25
	<p>Boundary: 16 0 My comment My scramble My solution</p> <p>The same error message as above should be shown.</p>	This input has no decimal point (and is not “DNF”), so should be rejected.	3.26
	<p>Boundary: 99.0 0 My comment My scramble My solution</p> <p>The information should be submitted and the corresponding item in the list should be updated with this information. The time should be converted to “1:39.00”.</p>	This has the form SS.s, so this should be accepted. 99.0 seconds is the same as 1 minute 39 seconds; times should be stored as either SS.ss (between 0 and 59.99 inclusive) or MM:SS.ss (between 00:00.00 and 59:59.59 inclusive)	3.27

		<p>Boundary: 0.0 0 My comment My scramble My solution</p>	This input has the form “S.s”, so this should be accepted.	3.28	
		The information should be submitted and the corresponding item in the list should be updated with this information.			

Scramble List

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
2.02.1	Click 'Add Scramble' button.	An input window should be shown, allowing the user to enter the scramble. After entering the scramble, the user can press 'OK' to submit the scramble. After submitting, the scramble should be appended to the list. Typical: 'F R U R' U' F' The scramble should be appended to the list. Erroneous: <blank>	- - An error message should not be shown because having a single blank datum is the equivalent of pressing cancel. UNSUCCESSFUL An exception is thrown and the stack trace is printed in the console because the code does not check for the string being null. See test index 2.02.2 for re-test and see the <i>Corrective Action</i> section for altered code.	- 3.29 -
2.02.2	Click 'Add Scramble' button.	Erroneous: <blank> No item should be appended to the list.	An error message should not be shown because having a single blank datum is the equivalent of pressing cancel. SUCCESSFUL	3.30

Solve Table → Solve Form Functionality

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
2.03	Click 'Submit' button with test data in form.	<p>The data entered in the form should be submitted for validation. (See 'Solve Editor Form functionality' for time tests).</p> <p>Erroneous: 15.22 0 My comment My scramble My solution 2014--**\$</p>	-	-
		<p>If the date entered is not valid, then the following error message should be shown:</p> <p>"Date must be valid and have the form: yyyy-MM-dd HH:mm:ss Would you like to use the current time?"</p> <p>If the user selects 'Yes', then the current time should be used as the date added; if the user selects 'No', then the user should have to change the data.</p>	The date is not in the correct format, so should be rejected.	3.31
		<p>Boundary: 15.22 0 My comment My scramble My solution 2014-02-29 21:00:02</p>	This input is in the correct format, but the date is not valid (2014 is not a leap year), so it should be rejected.	3.32
		<p>The same error message as above should be shown.</p>		

Member Table

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
2.04	Click 'Submit' button with test data in form.	The data entered in the form should be submitted for validation. Typical: John Johnston Male 22/04/1996 JJohnston@gmail.com 14S	- This is a set of typical valid data, so it should be accepted.	- 3.33
		The information should be submitted and the corresponding row in the table should be updated/added.		
		Erroneous: <blank> surname Female 01/01/2001 me@me.com 9T	All fields must be completed, so the blank forenames field should be rejected.	3.34
		An error message should be shown with the text: “Empty forenames”		
		Erroneous: Joe McPhee Male 01/01/2000 @gmail.com 10M	The email string does not comply with the RFC822 standard, so it should be rejected.	3.35
		An error message should be shown with the text: “Invalid email”		

		<p>Erroneous: Emma Griffin Female 22/04/1996 emma@gmail.com 14T</p> <p>An error message should be shown with the text: “Invalid date of birth”</p>	<p>This input has two consecutive ‘/’ characters, so it should be rejected.</p>	3.36														
		<p>Erroneous: James Moreton Male 19/08/1999 james@hotmail.com 10Q</p> <p>An error message should be shown with the text: “Invalid form class”</p>	<p>The form class must be {8, 9, 10, 11, 12, 13, 14}{M, R, S, T, W}, i.e.</p> <table><tr><td>8</td><td>M</td></tr><tr><td>9</td><td>R</td></tr><tr><td>10</td><td>S</td></tr><tr><td>11</td><td>T</td></tr><tr><td>12</td><td>W</td></tr><tr><td>13</td><td></td></tr><tr><td>14</td><td></td></tr></table>	8	M	9	R	10	S	11	T	12	W	13		14		3.37
8	M																	
9	R																	
10	S																	
11	T																	
12	W																	
13																		
14																		

Member-Competition Table → Member-Competition Form

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
2.05	Click 'Submit' button with test data in form.	<p>The data entered in the form should be submitted for validation. (See 'Solve Editor Form functionality' for time tests).</p> <p>Typical: Member ID: 3 Time 1: 14.20 Time 2: 13.25 Time 3: 14.16 Time 4: 13.89 Time 5: 12.79</p>	-	-
		<p>The information should be submitted and the corresponding row in the table should be updated/added.</p>	The member ID is chosen from a drop-down list of valid IDs.	3.38
		<p>Erroneous: Time 1: <blank></p>	All fields must contain data, so this input should be rejected.	3.39
		<p>A message should appear at the bottom of the window with the text: "Some of your times are invalid"</p>		

Preferences Window

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
2.06	Click 'Save and Close' button with test data in form.	The data entered in the form should be submitted for validation. Typical: 15 15 Yes 27	-	-
		The window should close with no error messages. The corresponding properties of the system should change accordingly.	-	3.40
		Erroneous: Real-time solving speed (ms): \$%	The input must be a number (which is rounded down to an integer), so the input string "\$%" should not be accepted.	3.41
		The text field's background should become red, indicating that the data is not valid.	The input must be a number (which is rounded down to an integer) consisting of digits; fifteen does not consist of digits, so it should be rejected.	3.42
		Erroneous: Inspection time (seconds): fifteen	The input must be a number (which is rounded down to an integer) consisting of digits; fifteen does not consist of digits, so it should be rejected.	3.42
		The text field's background should become red, indicating that the data is not valid.	The input must be a number.	3.43
		Erroneous: Scramble text size: large	-	3.44
		The text field's background should become red, indicating that the data is not valid.	-	3.44
		Boundary: Real-time solving speed: 1	-	3.44
		The window should close with no error messages, and real-time solving speed should change to 1 ms.	-	3.44

	<p>Boundary: Real-time solving speed: 0</p> <p>The text field's background should become red, indicating that the data is not valid.</p>	The <i>Real-time solving speed</i> must be between 1 and 9999 (inclusive).	3.45
	<p>Boundary: Real-time solving speed: 10000</p> <p>The text field's background should become red, indicating that the data is not valid.</p>	The <i>Real-time solving speed</i> must be between 1 and 9999 (inclusive).	3.46
	<p>Boundary: Inspection time (seconds): 0</p> <p>The text field's background should become red, indicating that the data is not valid.</p>	The <i>inspection time</i> must be between 1 and 99 (inclusive).	3.47
	<p>Boundary: Inspection time (seconds): 99</p> <p>The window should close with no error messages, and inspection time should change to 99 seconds.</p>	-	3.48
	<p>Boundary: Inspection time (seconds): 100</p> <p>The text field's background should become red, indicating that the data is not valid.</p>	The <i>inspection time</i> must be between 1 and 99 (inclusive).	3.49
	<p>Boundary: Scramble text size: 0</p> <p>The text field's background should become red, indicating that the data is not valid.</p>	The <i>scramble text size</i> must be between 1 and 99 (inclusive).	3.50
	<p>Boundary: Scramble text size: 1</p> <p>The window should close with no error messages, and the scramble text size should change to '1'.</p>	-	3.51
	<p>Boundary: Scramble text size: 100</p> <p>The text field's background should become red, indicating that the data is not valid.</p>	The <i>scramble text size</i> must be between 1 and 99 (inclusive).	-

Test Series 3

Solve Table

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
3.01	Click 'Sort by Time' (ascending) menu item.	The table should be ordered so that the records are sorted with the fastest time as the first record and the slowest time as the last.	Times that are over one minute, e.g. 1:27.54, will be treated as 87.54 seconds and sorted accordingly.	3.52
3.02	Click 'Sort by Date (descending)' menu item.	The table should be ordered so that the records are sorted with the most recent date first.	-	3.53
3.03	Click 'Sort by ID (ascending)' menu item.	The table should be ordered so that the records are sorted with the smallest ID first.	-	3.54
3.04	Click 'Filter by Time' menu item and enter 13.21 then 21.30	Only times greater than or equal to 13.21 and less than or equal to 21.30 should be shown in the table.	-	3.55

Solve Cube Algorithm

Test Index	Test Action	Expected	Evidence
3.05	Manually scramble cube with moves "F' U2 F2 D2 R2 F' D2 F2 R2 U2 F' R' D2 B' L' D2 R U' L"	Valid solution generated.	<p>Cross: Holding white top and green front: U L D B U R' U' z2</p> <p>Corners: U F' U' F U' y' R U2 R' U' R U R' U2 y' F' U' F U y' R U R'</p> <p>Edges: U L' U L U F U' F' y L' U L U F U' F' y L' U L U F U' F' y L' U L U F U' F'</p> <p>Permutation: L' U R' D2 R U' R' D2 R L U2 R U' R U R U R U' R' U' R2 U'</p>

Test Index	Test Action	Expected	Evidence
3.06	R2 U B2 D2 B2 F2 D' B2 R2 D B2 L F' D2 F2 R B F2 L B2 U	Valid solution generated.	Cross: Holding white top and green front: U L U2 F U2 F R U' B z2 Corners: y' R U R' y2 R U' R' F' U' F U2 y' F' U' F y2 R U2 R' U' R U R' Edges: y U' L' U L U F U' F' R U' R' U' F' U F y2 U' L' U L U F U' F' y L' U L U F U' F' y2 U' L' U L U F U' F' Orientation: U' F U R U' R' F' Permutation: U' L' U R' D2 R U' R' D2 R L U' R U' R U R U R U' R' U' R2 U
3.07	B2 U' L2 D B2 L2 D2 L2 U2 R2 U' B D' B2 L' D2 F' U' B F' D	Valid solution generated.	Cross: Holding white top and green front: U R U' R D F U L' z2 Corners: y2 F' U' F U2 y2 R U R' U' y' F' U' F y2 R U' R' F' U' F Edges: y2 U' R U' R' U' F' U F y U2 R U' R' U' F' U F y2 R U' R' U' F' U F y' U R U' R' U' F' U F Orientation: U F U R U' R' F' D' R' D R D' R' D R U2 R' D' R D R' D' R D Permutation: L' U R' D2 R U' R' D2 R L U R2 U R U R' U' R' U' R' U R' U

Test Index	Test Action	Expected	Evidence
3.08	R2 U L2 D' B L U2 R B' R2 D2 L D2 F2 R U2 R2 F2 U2 D2	Valid solution generated.	Cross: Holding white top and green front: U' F U' F U z2 Corners: U2 R U R' y' R U2 R' U' R U R' y' R U R' U' R U R' Edges: y2 L' U L U F U' F' y R U' R' U' F' U F y U2 R U' R' U' F' U F y' U2 L' U L U F U' F' Orientation: U F U R U' R' F' R' D' R D R' D' R D U2 R' D' R D R' D' R D U R' D' R D R' D' R D Permutation: L' U R' D2 R U' R' D2 R L U2 R U R U R' U' R2 U'
3.09	L F2 B2 U D2 F U' B' D R F2 B2 U2 L2 B2 R' F2 L B2 R2	Valid solution generated.	Cross: Holding white top and green front: U F' U2 L' D' F U L' U' R U z2 Corners: U' R U R' U' y2 F' U' F U y' R U R' y2 R U R' U' R U R' Edges: L' U L U F U' F' y' U L' U L U F U' F' y2 L' U L U F U' F' U' R U' R' U' F' U F Orientation: U' F U R U' R' F' D' R' D R D' R' D R U D' R' D R D' R' D R U2 D' R' D R D' R' D R Permutation: x' R U' R' D R U R' D' R U R' D R U' R' D' x M2 U M2 U M' U2 M2 U2 M'
3.10	U L D R L F U' F2 U' B2 L2 U2 L2 B L2 F D2 L2	Valid solution generated.	Cross: Holding white top and green front: U2 F U2 L' U z2 Corners: y' R U R' U' R U R' y R U R' U2 y R U R' U2 y F' U' F U' y2 R U R' Edges: y2 R U' R' U' F' U F L' U L U F U' F' y2 U R U' R' U' F' U F U' L' U L U F U' F' Orientation: U2 F U R U' R' F' D' R' D R D' R' D R U R' D' R D R' D' R D U R' D' R D R' D' R D U D' R' D R D' R' D R Permutation: U L' U R' D2 R U' R' D2 R L R2 U R U R' U' R' U' R' U R' U'

isBetterThan Algorithm

Test Index	Test Action	Explanation/Further Information	Expected
3.11	average1 = {12.29, 12.78, 13.42, 12.37, 12.90} average2 = {14.50, 14.77, 14.32, 14.81, 14.75} average1.isBetterThan(average2)	The average of 5 of average1 is 12.68, and the average of 5 of average2 is 14.67, so average1 is better.	True
3.12	average1 = {15.00, 15.01, 15.02, 15.03, 15.04} average2 = {14.99, 15.00, 15.01, 15.02, 15.03} average1.isBetterThan(average2)	The average of 5 of average1 is 15.02, and the average of 5 of average2 is 15.01, so average1 is slower than average2.	False
3.13	average1 = {10.00, 12.00, 12.00, 12.00, 12.00} average2 = {11.00, 12.00, 12.00, 12.00, 12.00} average1.isBetterThan(average2)	The average of 5 of average1 is 12.00, and the average of 5 of average2 is also 12.00, but the fastest time of average1 is faster than the fastest time of average2, so average1 is better than average2.	True
3.14	average1 = {11.00, 15.00, 12.00, 13.00, 14.00} average2 = {14.50, 11.00, 12.00, 13.00, 14.00} average1.isBetterThan(average2)	The average of 5 of average1 is 13.00 and the average of 5 of average2 is also 13.00. The fastest time of each average is the same, and so is the second fastest time, and the third and the fourth. However, the slowest time of average2 is faster than the slowest time of average1, so average2 is better than average2.	False

getSecondsToFormattedString Algorithm

Test Index	Test Action	Explanation/Further Information	Expected
3.15	getSecondsToFormattedString(90.2)	90.2 seconds is the same as 1 minute 30.20 seconds.	"1:30.20"
3.16	getSecondsToFormattedString(12.009)	Times should be recorded to 2 decimal places, so .009 should be rounded up to .01	"12.01"
3.17	getSecondsToFormattedString(60.)	-	"1:00.00"

sortByTime Algorithm

Test Index	Test Action	Expected
3.18	times = {16.61, 13.03, 13.26, DNF, 11.85, DNF, 14.73, 16.63, 9.92, 13.24} sortByTime(times, ..., ...)	{9.92, 11.85, 13.03, 13.24, 13.26, 14.73, 16.61, 16.63, DNF, DNF}
3.19	times = {6.59, 1:04.89, DNF, 32.54, 32:02.01, 12.69, 14.92, 3:39.44, 24.24, 30.00} sortByTime(times, ..., ...)	{6.59, 12.69, 14.92, 24.24, 30.00, 32.54, 1:04.89, 3:39.44, 32:02.01, DNF}

sortByDateAdded Algorithm

Test Index	Test Action	Expected
3.20	dates = { 2014-01-12 00:00:00, 2014-01-11 00:00:00, 2012-11-03 09:09:30, 2013-07-21 00:00:00, 2012-11-03 09:09:29 } sortByDateAdded(dates, ..., ...)	{ 2012-11-03 09:09:29, 2012-11-03 09:09:30, 2013-07-21 00:00:00, 2014-01-11 00:00:00, 2014-01-12 00:00:00 }

sortByAverageThenTime Algorithm

Test Index	Test Action	Expected
3.21	averages = {{{13.25, 13.64, 13.02, 13.28, 12.56}, {16.52, 16.78, 16.42, 16.31, 16.00}, {14.20, 13.25, 14.16, 13.89, 12.79}, {20.27, 21.30, 21.22, 19.58, 18.49}, {16.42, 16.51, 16.89, 20.56, 16.10}}} sortByAverageThenTime(averages, ..., ...)	{{{13.25, 13.64, 13.02, 13.28, 12.56}, {14.20, 13.25, 14.16, 13.89, 12.79}, {16.52, 16.78, 16.42, 16.31, 16.00}, {16.42, 16.51, 16.89, 20.56, 16.10}, {20.27, 21.30, 21.22, 19.58, 18.49}}}
3.22	averages = {{{15.00, 17.00, 17.00, 17.00, 18.00}, {14.00, 17.00, 17.00, 17.00, 17.00}, {16.00, 17.00, 17.00, 17.00, 19.00}, {14.00, 17.00, 17.00, 17.00, 18.00}, {15.00, 17.00, 17.00, 17.00, 18.00}}} sortByAverageThenTime(averages, ..., ...)	{{{14.00, 17.00, 17.00, 17.00, 17.00}, {14.00, 17.00, 17.00, 17.00, 18.00}, {15.00, 17.00, 17.00, 17.00, 18.00}, {15.00, 17.00, 17.00, 17.00, 18.00}, {16.00, 17.00, 17.00, 17.00, 19.00}}}

getAverageOf Algorithm

Test Index	Test Action	Explanation/Further Information	Expected
3.23	times = {12.12, 13.02, 15.65, DNF, 18.17} getAverageOf(5, times)	The fastest time (12.12) and the slowest time (DNF) should be removed and the average of the remaining three (13.02, 15.65, 18.17) is calculated	15.61
3.24	times = {12.12, 13.02, DNF, DNF, 18.17} getAverageOf(5, times)	Since there is more than one DNF in this average, the average should be DNF (which is represented numerically as -1)	-1.0
3.25	times = {11.00, 12.00, 12.00, 12.00, 12.00, 12.00, 12.00, 12.00, 12.00, 12.00, 12.00, 13.00} getAverageOf(12, times)	The fastest time (11.00) and the slowest time (13.00) will be removed and the average of the remaining 10 should be calculated.	12.0
3.26	times = {11.00, DNF, 12.00, 12.00, 12.00, 12.00, 12.00, 12.00, 12.00, 12.00, 12.00, 12.00, DNF} getAverageOf(12, times)	Since there is more than one DNF in this average, the average should be DNF (which is represented numerically as -1)	-1.0

Test Series 4

Main Window → Menu

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
4.01	Click 'Save Cube State' menu item.	A save dialog should be opened, prompting the user to choose a location for the file.	-	3.56
4.02	Click 'Save Statistics' menu item.	A save dialog should be opened, prompting the user to choose a location for the file.	-	-
4.03	Click 'Save Session to Database' menu item.	The solves should be added to the database, and the table in the 'Solve List' window should be updated.	-	3.57
4.04	Click 'Load Cube-State' menu item.	A load dialog should be opened, prompting the user to choose the file to load. Typical: standard cube-state with format "white, green, red, blue, white, ..." The visual cube should repaint and show the cube-state stored in the file. Erroneous: text file with random data "89"	- - -	3.58 3.59
4.05	Click 'Load Solve Information' menu item.	A load dialog should be opened, prompting the user to choose the file to load. Typical: standard, valid file The solve should be added to the list on the right-hand side of the screen, and the statistics should be updated Erroneous: random file The program should display an error message with the text, 'Invalid File'.	- - -	- 3.60 3.61

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
4.06	Click 'Delete Selected Solve' menu item.	Typical: an item in the list has been selected	-	3.62
		The selected time in the list should be removed.		
		Erroneous: no item has been selected	-	-
		A message should be shown informing the user that no item in the list has been selected.		

Main Window (Timing Mode)

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
4.07	Click 'Reset Times' button.	The times listed at the right-hand side of the window should be cleared. If there are no times listed, then nothing should happen.	-	3.63

Solve Editor Form

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
4.08	Click 'Save to File' button with test data in form.	A save dialog should be opened, prompting the user to choose a location for the file.	If the data is not valid, then the error message as described above should be shown.	-
4.09	Click 'Restore' button.	The text initially shown in the form should be restored.	Another way to perform a 'restore' operation would be to close the <i>solve editor form</i> , reselect the corresponding solve, and then edit it.	3.64
4.10	Click 'Delete' button.	The corresponding item in the list should be removed, and the form window should close.	-	3.65

Scramble List

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
4.11	Click 'Delete Scramble' button.	The selected items in the list should be removed.	If there are no items in the list or no items are selected, nothing should happen.	3.66
4.12	Click 'Save Selected to File' button.	A save dialog should be opened, prompting the user to choose a location for the file. The selected solves should then be written, one per line, to a text file in that location.	If there are no items in the list or none selected, then nothing should happen.	3.67

Time Graph

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
4.13	Click 'Save as Image' menu item.	A save dialog should be opened, prompting the user to choose a location for the file. The graph-display should be saved as a .png image file in the location selected.	-	3.68

Algorithm Table

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
4.14	Click 'Delete Algorithm' button.	The selected row should be removed from the table. The IDs should reset so that they are continuous, i.e. if an algorithm in the middle of the table is deleted, the IDs should reset to $1, 2, \dots, n$ in intervals of 1.	If nothing is selected, nothing should happen. If more than 5 algorithms are selected, then a warning message with the text, "Are you sure you want to delete?" will be shown in order to confirm the user's decision.	3.69

Solve Table

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
4.15	Click 'Delete Solve' button after selecting 5 rows.	A warning message should be displayed with the text "Are you sure you want to delete?" with 'Yes' and 'No' buttons. After selecting 'Yes', the warning message should close and the selected rows should be removed.	The warning message should only be shown if 5 or more rows are selected when the delete button is pressed. If the user selects 'No', the warning message should close and nothing should be removed.	3.70
4.16	Click 'Load into Program' button.	The data from the selected rows of the table should be loaded into the main window and listed at the right-hand side of the screen.	All data (time, comment, penalty, scramble, solution) should be loaded into the main window.	3.71

Member Table

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
4.17	Click 'Delete Member' button.	The selected rows from the table should be removed. A warning message should be shown in order to confirm the user's decision.	If nothing is selected, then nothing should happen.	3.72

Competition Table

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
4.18	Click 'Delete Competition' button.	The selected row should be removed from the table. A warning message should be shown in order to confirm the user's decision.	-	3.73

Member-Competition Table

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
4.19	Click 'Delete' button.	The selected rows should be removed from the table. A warning message should be shown, confirming the user's decision. The rankings should be updated.	-	3.74

Preferences

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
4.20	Click 'Restore Defaults' button.	Each field should be populated with the default preferences values for the system, and these should be saved.	-	3.75

Test Series 5

Functionality of Visual Cube

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
5.01	Press a key on keyboard to perform a move.	Typical: i The visual cube should repaint and show that the move (R) has been performed.	The move 'R' is mapped to the 'i' key on the keyboard, so all pieces in the right slice should move accordingly.	3.76
		Erroneous: z Nothing should happen since this is not a valid key. The program should not crash.	No move is mapped to the 'z' key, so nothing should happen.	-

Main Window → Menu

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
5.02	Click 'Use Scrambles in List' checkbox menu item.	After being clicked, the box should be checked, and the program should use the scrambles in the list for future scrambles, otherwise it should generate random scrambles. The following scrambles will be added to the scramble list: <ol style="list-style-type: none">1. B F R2 F2 L2 F U2 F' U2 L2 D2 R' D B' F' U R B2 L2 F2 R'2. L2 U2 L2 B2 U L2 F2 U R2 F2 D' B D F2 R' U R2 B R' F R'	After this box is checked, the first solve that the user completes should have the first listed scramble. The second solve should have the second listed scramble. The third solve should then reuse the first scramble. This should work for any number of scrambles (i.e. 1, 2, ..., n, 1, 2, ..., n, etc.)	3.77

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
5.03	Click 'Cancel Solve' menu item.	All processes relating to the visual cube should stop.	Processes that can be cancelled: inspection timer is running, solve timer is running, manual timer is running, or an automatic execution.	-
		Typical: the solve timer is running and the 'Cancel Solve' menu item is clicked	-	3.78
		The top-left timer should stop and should show '0.00'.	-	-
		Typical: the execution of a recorded solve is being viewed and the 'Solve Piece' menu item is clicked	-	-
		All animation should stop.	-	-
		Erroneous: there is no process to cancel	-	-
		The program should not crash.	-	-
5.04	Click 'Apply Random Scramble' menu item.	A random scramble should be applied to the cube, the visual cube repainted, and the scramble displayed at the top of the window.	The scramble should only be shown if the 'Show Current Scramble' menu item is checked.	3.79
5.05	Close 'Color Selection' window.	Erroneous: the cube is not in a valid state, then select 'No' in the warning window. A message should be shown with the text, "This is not a valid state. Would you like to reset the cube?" After selecting 'No', the stickers on the invalid pieces should be greyed out.	If the cube was unsolvable after closing the color selection window, then this would create problems later, such as the user being unable to complete a solve because the cube cannot be completely solved, which could also lead to run-time errors etc.)	3.80

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
5.06	Click 'Clear Stickers' menu item (with no other processes in action)	All of the stickers on the cube should change to grey.	If the custom painting window is not open, this menu item should be disabled (greyed out). If the custom painting window is open, then when this menu item is clicked, all of the stickers on the cube should change to grey. This button should not have any effect when a) the cube is being solved automatically b) a timer is running c) a tutorial is running	3.81
5.07	Click 'Solve Cube' menu item.	The solution should be shown in the text area at the bottom, and the cube should perform the solution automatically.	-	3.82

Main Window (Timing Mode)

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
5.08	Click ‘Solve Piece’ menu item, click on the red-green edge then select ‘Yes’.	After clicking on the red-green edge, a warning message should be shown with the text, “You have selected the red-green Edge, do you wish to continue?”. The solution should be shown in the text area at the bottom, and the cube should perform the solution automatically.	In the preferences, there is an option to show or not show the information message with the text, “Click on a piece to view solution”. If the ‘Yes’ radio button is selected, then it will be shown, otherwise it will not be shown.	3.83
5.09	Click ‘Start New Solve’ button.	The cube should be scrambled randomly, and the inspection timer should start.	The user can start the incrementing timer by pressing spacebar. Once the cube is solved, the incrementing timer should stop, and the time, penalty, scramble, and solution should be stored. The time should be appended to the list at the right-hand side of the screen.	3.84
5.10	Click ‘Reset Cube’ button.	<p>Typical: the user is solving the cube</p> <p>The cube should be reset to a solved state with white on top and green on front.</p>	All timers and animations should stop when the reset cube button is pressed. If timers etc. were not stopped, then this would be a shortcut to solving the cube during a solve, allowing the user to ‘cheat’.	3.85

Main Window (Tutorial Mode)

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
5.11	Perform the moves required to solve the problem posed by the current sub-tutorial.	Typical: the number of moves used is equal to the optimum number of moves	A set of 'optimal' algorithms are given for each sub-tutorial. If the user uses an 'optimum' number of moves, then this message will be shown. For example, if the solution to the problem is $F' U' F$, and the user performs $y' R' U' R$, this message will be shown since the number of moves (rotations are not counted) performed is 3 – the same as the optimum solution.	3.86
		A message should be shown with the text, "Well done! Would you like to play again?"		3.87
		Typical: the number of moves used is more than the optimum number of moves	If 'Yes' is selected, then the problem will be posed again, otherwise the solution, along with its explanation, will be shown.	
		A message should be shown with the text, "Well done! Would you like to play again?"		

Solve Editor Form

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
5.12	Click ‘View Execution’ button.	The text in the scramble field should be interpreted as moves and then performed on the cube. The moves in the solution field should then be performed on the cube in real time, i.e. the cube should be animated to show the moves being performed.	It does not matter what the data in the text field is – there is no ‘erroneous’ data for moves. For example, if the scramble was “hello there” and the solution was “goodbye”, then nothing would happen and the program would not crash.	-

Scramble List

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
5.13	Click ‘Apply Scramble’ button.	The selected scramble’s moves should be applied to the cube.	If any timers are running or any animations are taking place, then this should not have any effect.	3.88

Time Graph

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
5.14	Click ‘Always on Top’ checkbox menu item.	When the box is checked, the time graph window should stay on top of all other windows. If it is not checked, then the window should be able to hide behind other windows.	The box is checked by default.	-
5.15	Click ‘Reset Zoom’ button.	The graph should reset to its default zoom.	-	3.89

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
5.16	Click '3D' radio button.	The graph should switch from a 2D view to 3D view.	The graph should be displayed in the form indicated by the selected radio button.	3.90

Algorithm Table

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
5.17	Click 'Add Algorithm' button.	A row should be appended to the table.	-	3.91
5.18	Click 'Apply Reverse' button.	The algorithm should be applied to the visual cube in reverse. For example, if the algorithm is R U F B, then B' F' U' R' would be applied. If nothing is selected, then nothing should happen.	This means that algorithms can be practised by applying the reverse of the algorithm, then the user can perform the normal algorithm.	3.92
5.19	Click 'View Execution' button.	The algorithm should be animated on the cube automatically. If nothing is selected, nothing should happen.	-	-

Competition Table

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
5.20	Click 'Add Competition' button.	A row should be added to the table.	-	3.93

Preferences Window

Test Index	Test Action	Expected	Explanation/Further Information	Evidence
5.21	Click 'Cancel' button.	The window should close, and no changes should be saved.	-	-

Corrective Action

Changes made after test 1.18.1

This change ensures that `hintIndex` always lies in the valid region.

Before

```
public void loadNextHint() {  
    ++hintIndex;  
}
```

After

```
public void loadNextHint() {  
    hintIndex = (hintIndex + 1) % hints[subTutorialIndex].length;  
}
```

Changes made after test 2.02.1

This change ensures that the string is not null before continuing.

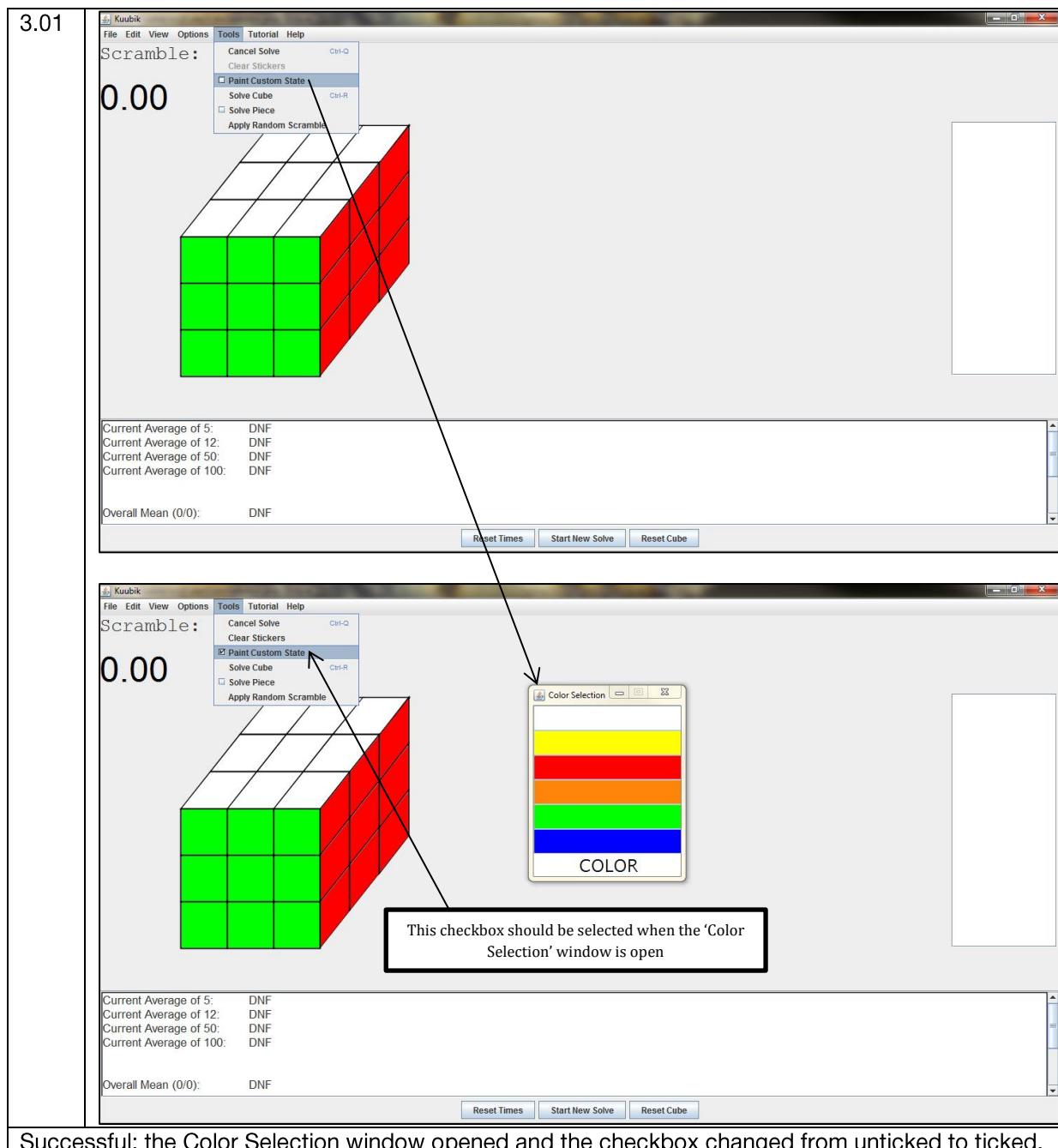
Before

```
public void actionPerformed(ActionEvent e) {
    String scramble = JOptionPane.showInputDialog(null, "Enter Scramble", "R U R' U'");
    if (!scramble.trim().equals("")) {
        scrambleList.addElement(" " + scramble.trim());
        listHolder.ensureIndexIsVisible(scrambleList.getSize() - 1);
        listHolder.setSelectedIndex(scrambleList.getSize() - 1);
    }
}
```

After

```
public void actionPerformed(ActionEvent e) {
    String scramble = JOptionPane.showInputDialog(null, "Enter Scramble", "R U R' U'");
    if (scramble != null && (!scramble.trim().equals(""))) {
        scrambleList.addElement(" " + scramble.trim());
        listHolder.ensureIndexIsVisible(scrambleList.getSize() - 1);
        listHolder.setSelectedIndex(scrambleList.getSize() - 1);
    }
}
```

Testing Evidence



3.02

Tutorial

0.00

The starting text/description for this 'Corners' tutorial is shown

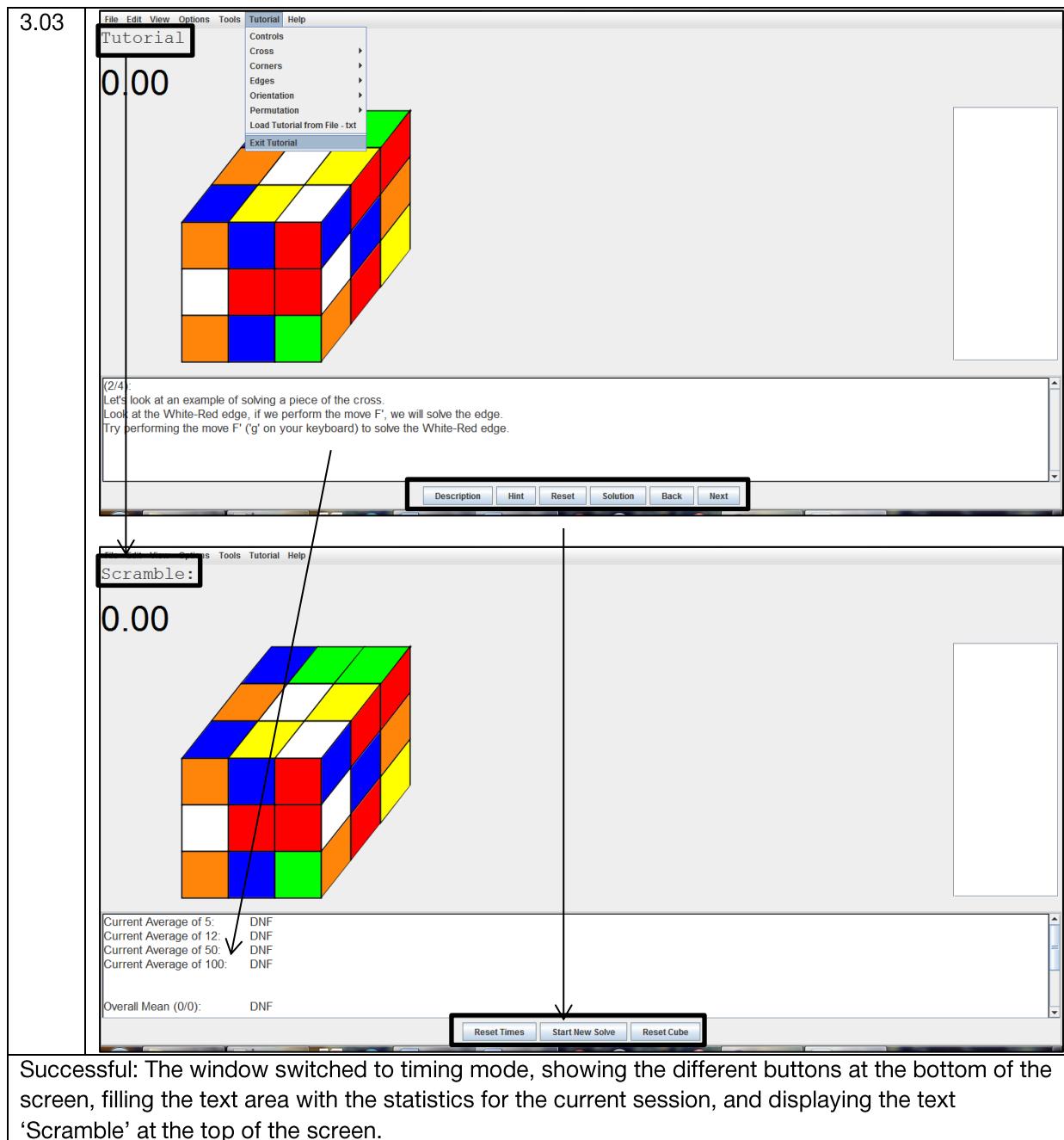
(1/11):

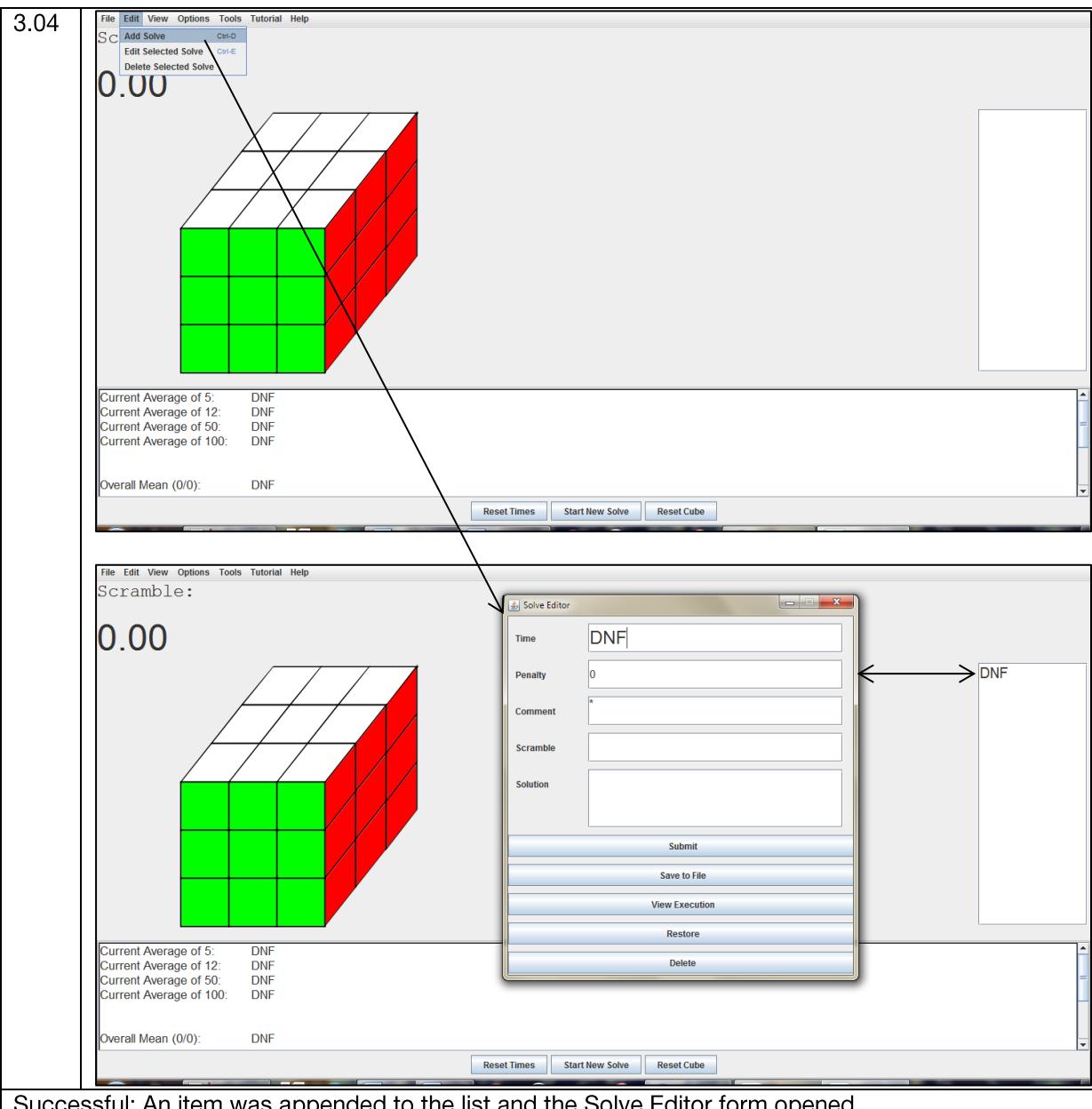
In this tutorial, you will learn how to solve the first-layer corners of the Rubik's cube. A corner is any cube that has three stickers. A first-layer corner is any corner that includes a white sticker. For example, the White-Red-Green cube is a corner since it has three stickers, and is also a first-layer corner since it has a white sticker. The Yellow-Blue-Orange cube is also a corner since it has three stickers, but it is not a first-layer corner since it doesn't have a white sticker.

You start solving the first-layer corners after you solve the cross. When solving the corners, you hold the white centre on the bottom. To solve a corner, you first need to bring it 'above' its destination. For example, if you are solving the White-Blue-Red corner, its destination is between the White, Blue, and Red centres, so to bring the corner 'above' its destination

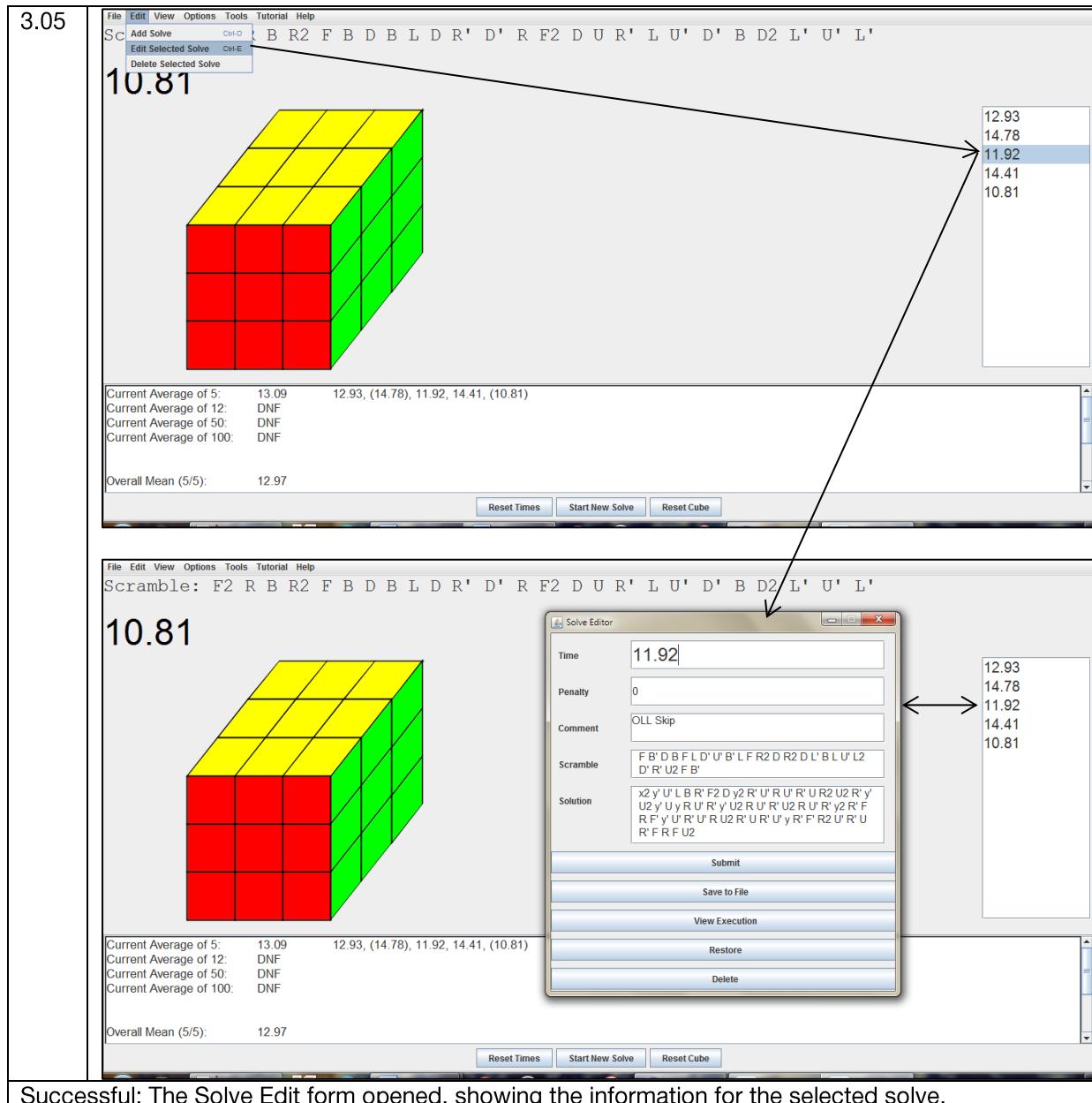
Description Hint Reset Solution Back Next

Successful: The window switched to tutorial mode, showing the different buttons at the bottom of the screen, filling the text area with the starting text for the chosen tutorial, and displaying the text 'Tutorial' at the top of the screen.

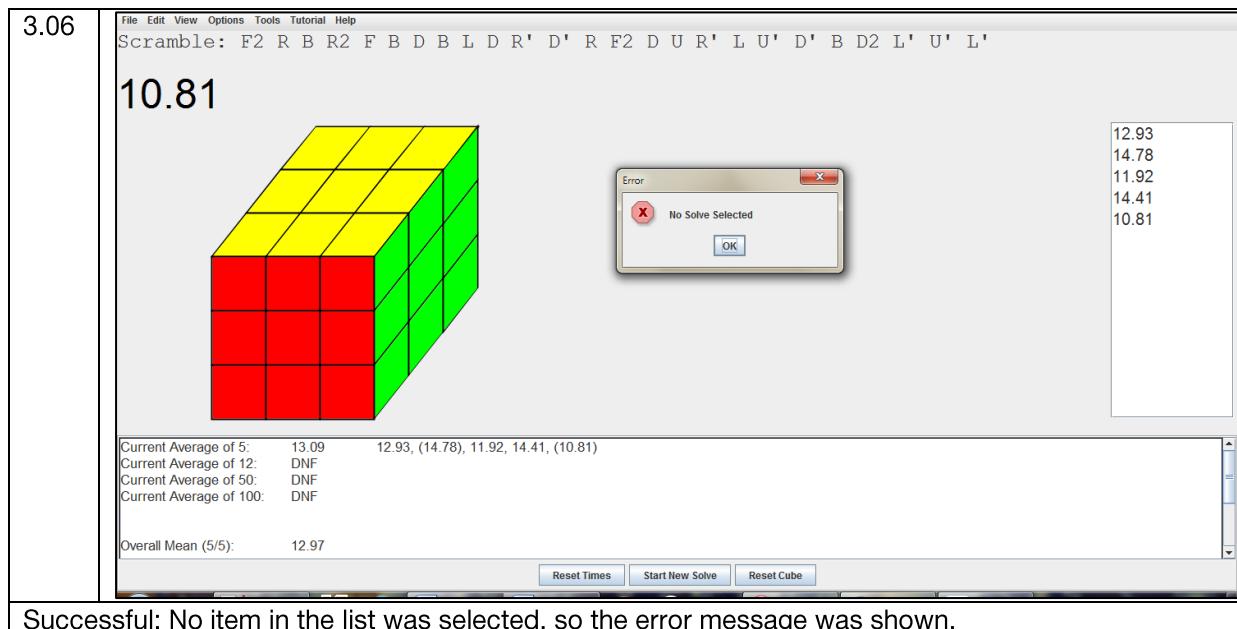




Successful: An item was appended to the list and the Solve Editor form opened.



Successful: The Solve Edit form opened, showing the information for the selected solve.



Successful: No item in the list was selected, so the error message was shown.

3.07

File Edit View Options Tools Tutorial Help
Tutorial
0.00

Hint 1: Perform U R U' R' U' F' U F (j i f k f g j h on your keyboard)

Description Hint Reset Solution Back Next

File Edit View Options Tools Tutorial Help
Tutorial
0.00

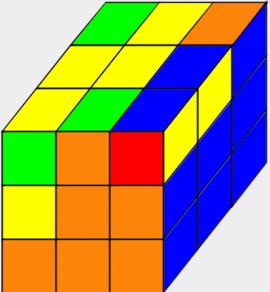
(2/6):
The process of solving edges is as follows:
Find a middle-layer edge (an edge without a yellow sticker) in the top-layer. Perform U until the front sticker of the edge matches with its corresponding centre and rotate the cube so that both of them are facing you, then perform the appropriate algorithm.
Look at the orange-green edge. The green sticker of the orange-green edge is matched-up with the green centre so no setup is required. Which algorithm do we use? Well, the edge needs to go to the RIGHT since the orange centre is to the right, so we use the algorithm:

Description Hint Reset Solution Back Next

Successful: The description for the current sub-tutorial was shown.

3.08

File Edit View Options Tools Tutorial Help
Tutorial
0.00

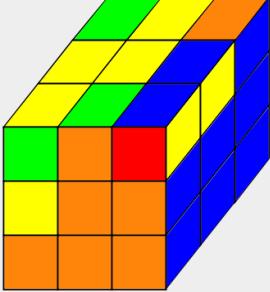


(3/6):
Look at the orange-green edge. The orange sticker of the orange-green edge is matched-up with the orange centre so no setup is required. Which algorithm do we use? Well, the edge needs to go to the LEFT since the green centre is to the right, so we use the algorithm:
 $U' L' U L U F U' F'$

Try performing these moves to solve the orange-green edge.

Description Hint Reset Solution Back Next

File Edit View Options Tools Tutorial Help
Tutorial
0.00



Hint 1: Perform $U' L' U L U F U' F'$ (f e j d j h f g on your keyboard)

Description Hint Reset Solution Back Next

Successful: The next hint for the current sub-tutorial was shown.

3.09

File Edit View Options Tools Tutorial Help
Tutorial
0.00

(3/6)
Look at the orange-green edge. The orange sticker of the orange-green edge is matched-up with the orange centre so no setup is required. Which algorithm do we use? Well, the edge needs to go to the LEFT since the green centre is to the right, so we use the algorithm:
 $U' L' U L U F U' F'$

Try performing these moves to solve the orange-green edge.

Description Hint Reset Solution Back Next

File Edit View Options Tools Tutorial Help
Tutorial
0.00

(3/6)
Look at the orange-green edge. The orange sticker of the orange-green edge is matched-up with the orange centre so no setup is required. Which algorithm do we use? Well, the edge needs to go to the LEFT since the green centre is to the right, so we use the algorithm:
 $U' L' U L U F U' F'$

Try performing these moves to solve the orange-green edge.

Description Hint Reset Solution Back Next

Successful: The cube was reset to the state originally presented at the start of the sub-tutorial.

3.10

File Edit View Options Tools Tutorial Help
Tutorial

0.00

(4/6): Try solving the blue-red-orange on your own.

Description Hint Reset Solution Back Next

File Edit View Options Tools Tutorial Help
Tutorial

0.00

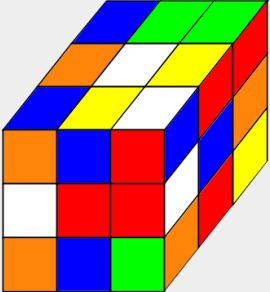
Solution: We need to move the edge to the left (since the orange-green edge's destination is to the left), so we perform the corresponding algorithm.
Optimal solutions include:
 $U y U' L' U L U F U' F'$

Description Hint Reset Solution Back Next

Successful: The solution for the current sub-tutorial was shown.

3.11

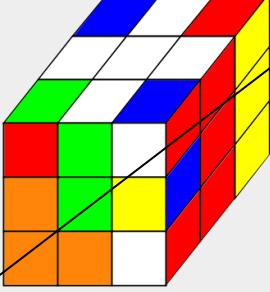
File Edit View Options Tools Tutorial Help
Tutorial
0.00



(2/4)
Let's look at an example of solving a piece of the cross.
Look at the White-Red edge, if we perform the move F', we will solve the edge.
Try performing the move F' ('g' on your keyboard) to solve the White-Red edge.

Description Hint Reset Solution Back Next

File Edit View Options Tools Tutorial Help
Tutorial
0.00



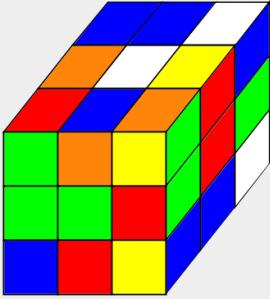
(1/4)
Welcome to the cross tutorial.
The method you will be learning is a beginners' variation of the CFOP (Cross-F2L-OLL-PLL) method.
The first step in this beginners' method is the 'Cross'. In the simulation window, you can see example of a cross on the white face.
A cross consists of four solved edges with a common colour. In this example, the white cross has been solved since the White-Green, White-Red, White-Blue, and White-Orange edges are all solved.
You can solve the cross on any face (White, Yellow, Red, Orange, Green, or Blue), but the most popular colour is white, so we will stick with this colour.

Description Hint Reset Solution Back Next

Successful: The previous sub-tutorial was loaded, showing the description for that sub-tutorial.

3.12

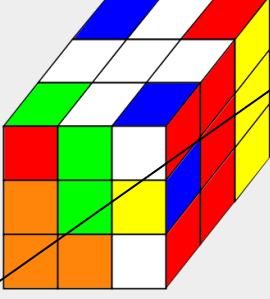
File Edit View Options Tools Tutorial Help
Tutorial
0.00



(3/4)
Here, the White-Red edge is at the Down-Front position. We can solve it using D R2.
Try performing the moves D R2 ('s r' on your keyboard) to solve the White-Red edge.

Description Hint Reset Solution Back Next

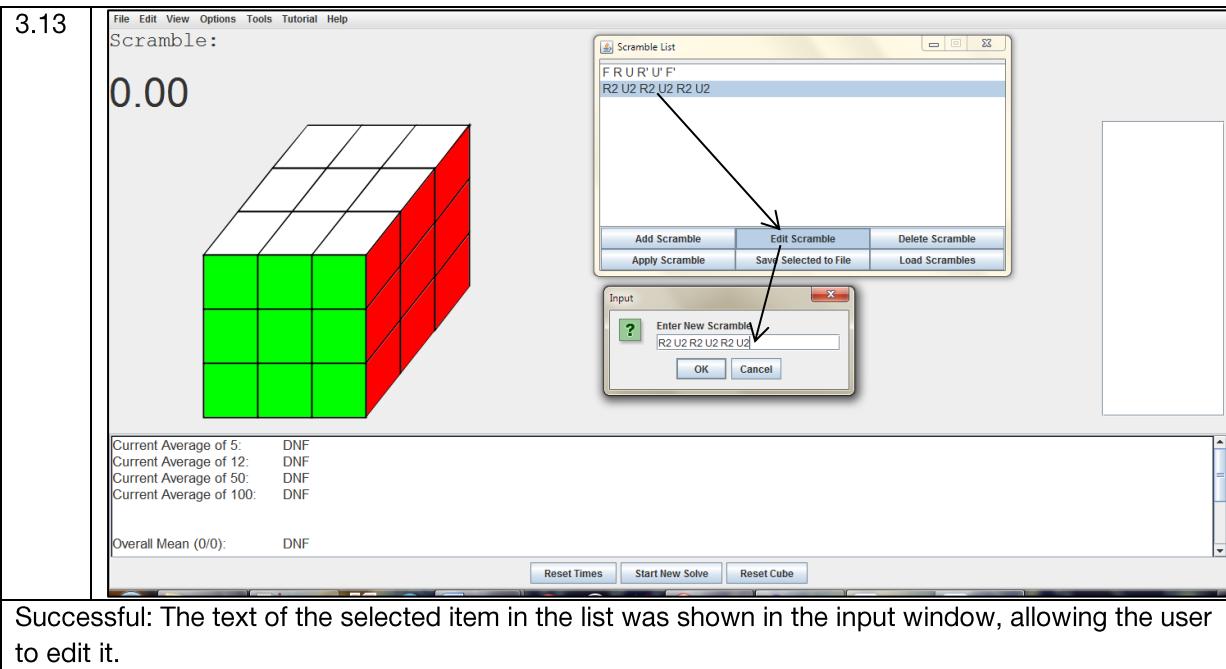
File Edit View Options Tools Tutorial Help
Tutorial
0.00



(4/4)
Congratulations! You have reached the end of the beginner cross tutorial. Hopefully you now have a better understanding of how to get started when solving a Rubik's cube.

Description Hint Reset Solution Back Next

Successful: The next sub-tutorial was loaded, showing the description for that sub-tutorial.



3.14

ID	Time	Penalty	Comment	Scramble	Solution	Date Added
9	12.19	0		L' D' U' 2 R U' D L' ...	x2 U' L2 R' U' R' F' y' R U' ...	2014-03-08 20:33:16
8	12.29	0	Easy	F' B' R2 U2 B F D ...	y x2 R' F2 D2 y' R' U' R' L' ...	2014-03-08 20:33:16
26	14.36	0		L' R2 D F2 R' D' ...	x2 y L U' R' F B' y' U' R' U' ...	2014-03-08 20:50:51
11	14.46	0		D F' D2 R2 F' R' ...	x2 y D U R' F L B2 D' R' ...	2014-03-08 20:33:16
12	15.31	0		L2 U2 R L' F2 U B ...	x2 D' R2 y' R' U' R' F' y' U2' ...	2014-03-08 20:33:16
2	16.37	0	PLL Skip	D' F D' R D U L2 ...	x2 y2 F D2 U2 R' F R2 y' ...	2014-03-08 20:33:16
27	16.37	0		R' D' U R U B F2 ...	x2 R' B' R2 F D y' R' y ...	2014-03-08 22:16:24
13	16.43	0		U' F D' U' R' U' F' ...	x2 y' B' U' R' F' U' L2 U' R' U' ...	2014-03-08 20:33:16
15	17.01	0		L2 U' R' D2 U2 F' ...	x2 L' F' D' R' D' R D2 y' U' ...	2014-03-08 20:33:16
28	17.06	0		R2 L U' B' F D B' ...	x2 y' R' D' R' y' R2 F' y2 L' ...	2014-03-08 22:16:24
29	17.22	0		F B D' R' B' L' F' ...	x2 y' R' D' L' B' y' D' R' D' ...	2014-03-08 22:16:24
5	17.33	0		R2 B' F2 R B2 R' ...	x2 D' R' B' D' y' L' U' L' F' R' ...	2014-03-08 20:33:16
4	17.75	0		L' D' U' F D2 U2 B ...	y x2 y2 D L R F R2 D L2 y' ...	2014-03-08 20:33:16
3	18.44	0		U' D2 R2 L' U' F2 ...	x2 U' R' F' B' R2 L' D' U' R' ...	2014-03-08 20:33:16
1	18.81	0		U' B' F' L' R2 U2 F ...	x2 y' R2 M2 U2 M2 y' U' L' ...	2014-03-08 20:33:16
7	19.29	0		F2 R' U' L2 U' B R ...	x2 y' D2 R2 D2 R2 F' y' R ...	2014-03-08 20:33:16
14	19.50	0		B' R' B' L' R' D2 F ...	x2 y' d L R' U' R' F D2 y' ...	2014-03-08 20:33:16
10	20.40	0	Bad cross	F' R D R U2 L2 F' ...	x2 y' D' R' B' R' y' U' R' F' ...	2014-03-08 20:33:16
31	21.57	0		D2 L B2 F2 D2 F' ...	y2 x2 y' R2 F B' R y2 D R' ...	2014-03-08 22:16:24
30	21.73	0		L' D B D U' F2 D2 ...	x2 y' D' U2 L' F' B y' F' D R' ...	2014-03-08 22:16:24
6	31.11	0		B' F' L' D2 L2 U' L ...	x2 y' D' R' F' y' D F y' L' F' L' ...	2014-03-08 20:33:16

Add Solve Edit Solve Delete Solve Load into Program

Current Average of 100: DNF

Overall Mean (0/0): DNF

Reset Times Start New Solve Reset Cube

Solve Form

Time

Penalty

Comment

Scramble

Solution

Date Added

Submit

Add Solve Edit Solve Delete Solve Load into Program

Current Average of 100: DNF

Overall Mean (0/0): DNF

Reset Times Start New Solve Reset Cube

3.15

ID	Time	Penalty	Comment	Scramble	Solution	Date Added
9	12.19	0		L' D' U2 R U ..	x2 U' L2 R' ..	2014-03-08 ..
8	12.29	0	Easy	F' B' R2 U2 ..	y' x2 R' F2 ..	2014-03-08 ..
26	14.36	0		L' R2 D F2 ..	x2 y L U R' ..	2014-03-08 ..
11	14.46	0		D' F' D2 R2 ..	y x2 y D U ..	2014-03-08 ..
32	15.22	0	My comment	My scramble	My solution	2014-03-10 ..
12	15.31	0		L2 U2 R L' ..	x2 D' R2 y' ..	2014-03-08 ..
2	16.37	0	PLL Skip	D' F D' R D ..	x2 y F D2 ..	2014-03-08 ..
27	16.37	0		R' D' U R U ..	x2 R' B' R2 ..	2014-03-08 ..
13	16.43	0		U' F D' U' R' ..	x2 y B' U' R' ..	2014-03-08 ..
15	17.01	0		L2 U' R' D2 ..	x2 L F' D' R ..	2014-03-08 ..
1	18.81	0		U B' F' L' R' ..	x2 y R2 M2 ..	2014-03-08 ..
7	19.29	0		F2 R' U' L2 ..	x2 y2 D R2 ..	2014-03-08 ..
14	19.50	0		B' R' B L' R' ..	y' x2 y D L ..	2014-03-08 ..
10	20.40	0	Bad cross	F' R D R U2 ..	x2 y' D R' B' ..	2014-03-08 ..
31	21.57	0		D2 L B2 F2 ..	y2 x2 y' R2 ..	2014-03-08 ..
30	21.73	0		L D B D U F ..	x2 y' D' U2 L ..	2014-03-08 ..
6	31.11	0		B' F L' D2 L ..	x2 y' D' R F ..	2014-03-08 ..

Solve Form	
Time	14.46
Penalty	0
Comment	
Scramble	D' F' D2 R2 F' R' F' D' U L2 B' L2 U2 F2 U2 B2 R' U' D' R' L' B' R' D' R2
Solution	y x2 y D U R' F L B2 D' R' U' R' y' R' U' R y2 U R' U' R y R U' R' y' U' y' R' U' R U' R' U' R' F' R' F' U2 R' F' R' F' U2 L' R' D2 R U' R' D2 R' U' L' U'
Date Added	2014-03-08 20:33:16

Successful: The Solve Form window opened, showing the information in the selected record.

3.16

ID	Forenames	Surname	Gender	Date of Birth	Email	Form Class
1	Ryan Charles	Jones	Male	24/01/2002	rjones@gmail.com	8W
2	Thomas	Smith	Male	13/12/1998	tsmith@hotmail.com	11M
3	Jack	Cooper	Male	22/05/2001	jcooper@hotmail.com	9S
4	Lee	Brown	Male	18/01/1998	lbrown@gmail.com	12R
5	Joy	Montgomery	Female	22/10/2000	jmontgomery@gmail.com	9S
7	Lily	Green	Female	14/02/1996	lgreen@yahoo.com	14T
8	William	Johnston	Male	12/03/2000	wjohnston@gmail.com	10S
9	Simon	Lane	Male	05/09/1995	slane@gmail.com	14R
11	Hannah	Laverty	Female	21/04/1996	hlaverty@hotmail.com	14M
12	Sarah	Rutherford	Female	28/11/1996	srutherford@gmail.com	13M
13	Sam	Middleton	Male	10/09/1999	smiddleton@gmail.com	10W

ID	Forenames	Surname	Gender	Date of Birth	Email	Form Class
1	Ryan Charles	Jones	Male	24/01/2002	rjones@gmail.com	8W
2	Thomas	Smith	Male	13/12/1998	tsmith@hotmail.com	11M
3	Jack	Cooper	Male	22/05/2001	jcooper@hotmail.com	9S
4	Lee	Brown	Male	18/01/1998	lbrown@gmail.com	12R
5	Joy	Montgomery	Female	22/10/2000	jmontgomery@gmail.com	9S
7	Lily	Green	Female	14/02/1996	lgreen@yahoo.com	14T
8	William	Johnston	Male	12/03/2000	wjohnston@gmail.com	10S
9	Simon	Lane	Male	05/09/1995	slane@gmail.com	14R
11	Hannah	Laverty	Female	21/04/1996	hlaverty@hotmail.com	14M
12	Sarah	Rutherford	Female	28/11/1996	srutherford@gmail.com	13M
13	Sam	Middleton	Male	10/09/1999	smiddleton@gmail.com	10W

Successful: The Member Form window opened.

3.17

Member Table

ID	Forenames	Surname	Gender	Date of Birth	Email	Form Class
1	Ryan Charles	Jones	Male	24/01/2002	rjones@gmail.com	8W
2	Thomas	Smith	Male	13/12/1998	tsmith@hotmail.com	11M
3	Jack	Cooper	Male	22/05/2001	jcooper@hotmail.com	9S
4	Lee	Brown	Male	18/01/1998	lbrown@gmail.com	12R
5	Joy	Montgomery	Female	22/10/2000	jmontgomery@gmail.com	9S
7	Lily	Green	Female	14/02/1996	lgreen@yahoo.com	14T
8	William	Johnston	Male	12/03/2000	wjohnston@gmail.com	10S
9	Simon	Lane	Male	05/09/1995	slane@gmail.com	14R
11	Hannah	Laverty	Female	21/04/1996	hlaverty@hotmail.com	14M
12	Sarah	Rutherford	Female	28/11/1996	srutherford@gmail.com	13M
13	Sam	Middleton	Male	10/09/1999	smiddleton@gmail.com	10W

Add Member Edit Member Delete Member

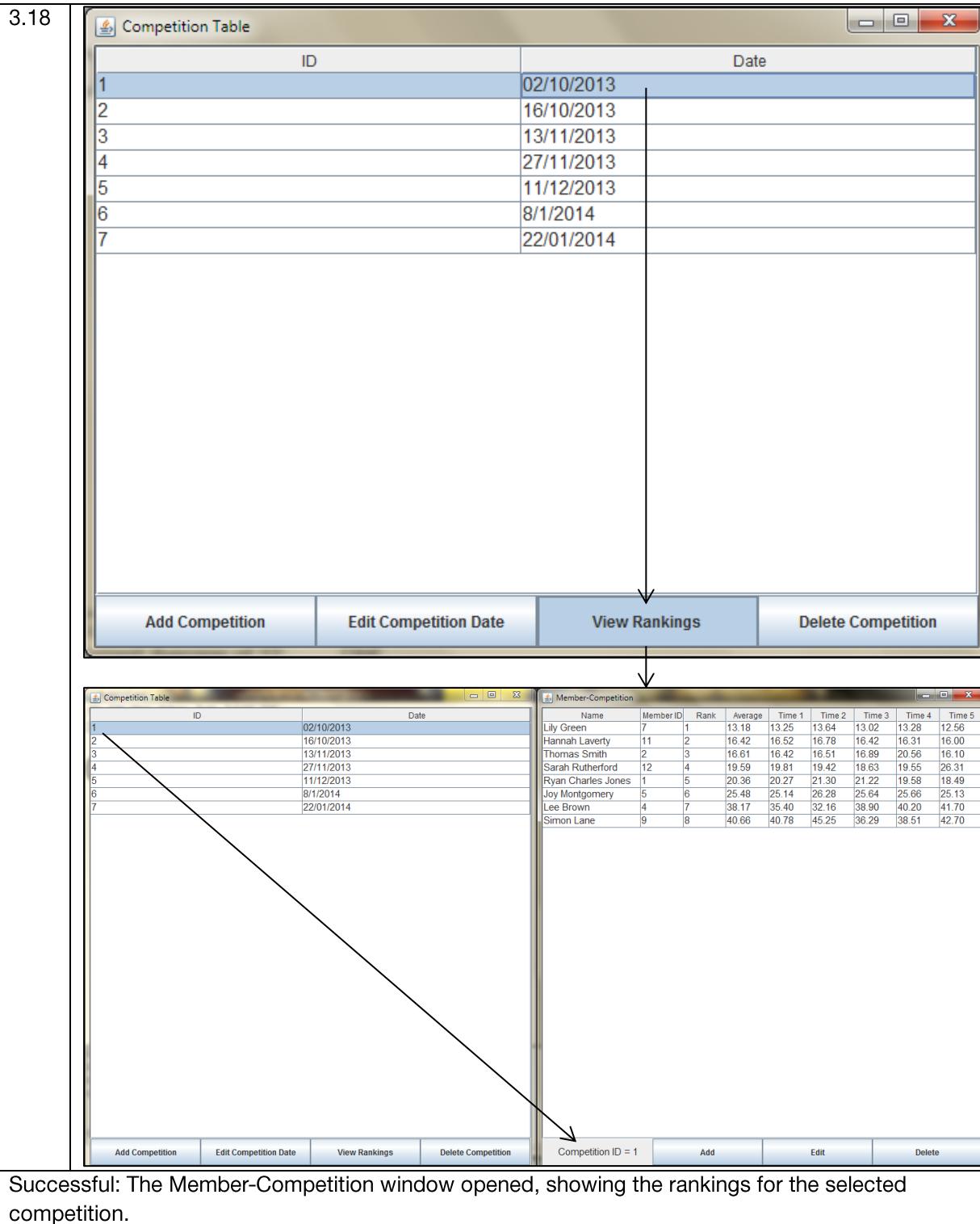
Member Form

Forenames	Joy
Surname	Montgomery
Gender	Female
Date of Birth	22/10/2000
Email	jmontgomery@gmail.com
Form Class	9S

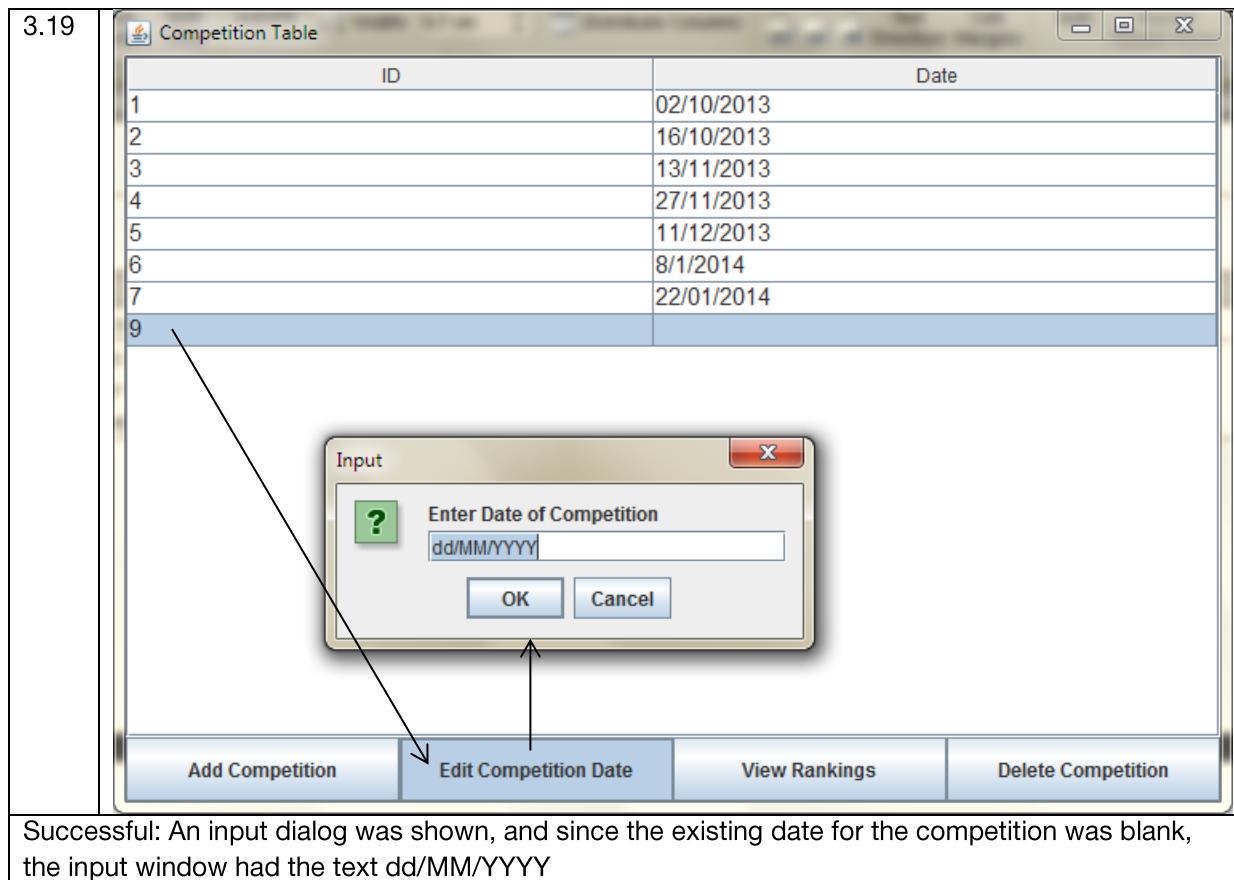
Submit

Add Member Edit Member Delete Member

Successful: The Member Form window opened, showing the information in the selected row.



Successful: The Member-Competition window opened, showing the rankings for the selected competition.



3.20

The screenshot illustrates a software interface for managing competition data. The top window, titled "Member-Competition", is a grid view showing the following data:

Name	Member ID	Rank	Average	Time 1	Time 2	Time 3	Time 4	Time 5
Lily Green	7	1	13.18	13.25	13.64	13.02	13.28	12.56
Hannah Laverty	11	2	16.42	16.52	16.78	16.42	16.31	16.00
Thomas Smith	2	3	16.61	16.42	16.51	16.89	20.56	16.10
Sarah Rutherford	12	4	19.59	19.81	19.42	18.63	19.55	26.31
Ryan Charles Jones	1	5	20.36	20.27	21.30	21.22	19.58	18.49
Joy Montgomery	5	6	25.48	25.14	26.28	25.64	25.66	25.13
Lee Brown	4	7	38.17	35.40	32.16	38.90	40.20	41.70
Simon Lane	9	8	40.66	40.78	45.25	36.29	38.51	42.70

The bottom window, titled "Member-Competition Form", contains a form with the following fields:

- Member ID: A dropdown menu currently showing "3".
- Time 1: An input field containing "3".
- Time 2: An input field containing "13".
- Time 3: An empty input field.
- Time 4: An empty input field.
- Time 5: An empty input field.
- Submit: A button at the bottom.

A callout box points from the Member ID dropdown to a note: "The remaining members for whom data is not recorded for this competition have member IDs 3, 13, and 14".

Successful: The Member-Competition Form window was shown, allowing the user to enter information about a new record.

3.21

The screenshot shows a Windows application window titled "Member-Competition". Inside, there is a table with columns: Name, Member ID, Rank, Average, Time 1, Time 2, Time 3, Time 4, and Time 5. The table contains data for eight members. Below the table is a toolbar with buttons for Competition ID = 1, Add, Edit, and Delete. An arrow points from the "Edit" button to a second window titled "Member-Competition Form". This form has fields for Member ID (set to 1), Time 1 (20.27), Time 2 (21.30), Time 3 (21.22), Time 4 (19.58), and Time 5 (18.49). A "Submit" button is at the bottom. The status bar at the bottom of the application window says "Successful: The Member-Competition Form opened, showing the information from the selected row in the table."

Name	Member ID	Rank	Average	Time 1	Time 2	Time 3	Time 4	Time 5
Lily Green	7	1	13.18	13.25	13.64	13.02	13.28	12.56
Hannah Laverty	11	2	16.42	16.52	16.78	16.42	16.31	16.00
Thomas Smith	2	3	16.61	16.42	16.51	16.89	20.56	16.10
Sarah Rutherford	12	4	19.59	19.81	19.42	18.63	19.55	26.31
Ryan Charles Jones	1	5	20.36	20.27	21.30	21.22	19.58	18.49
Joy Montgomery	5	6	25.48	25.14	26.28	25.64	25.66	25.13
Lee Brown	4	7	38.17	35.40	32.16	38.90	40.20	41.70
Simon Lane	9	8	40.66	40.78	45.25	36.29	38.51	42.70

Competition ID = 1 Add Edit Delete

Member-Competition Form

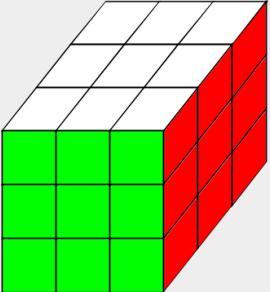
Member ID	1
Time 1	20.27
Time 2	21.30
Time 3	21.22
Time 4	19.58
Time 5	18.49

Submit

Successful: The Member-Competition Form opened, showing the information from the selected row in the table.

3.22

Scramble: 0.00



Solve Editor

Time	18.86
Penalty	0
Comment	*
Scramble	U R U' R'
Solution	R U R' U'

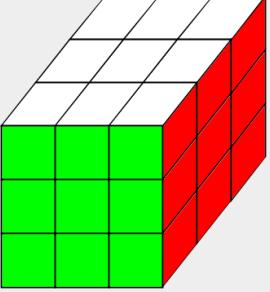
Submit
Save to File
View Execution
Restore
Delete

Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

Overall Mean (0/0): DNF

Reset Times Start New Solve Reset Cube

Scramble: 0.00



18.86

Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

Overall Mean (1/1): 18.86

Reset Times Start New Solve Reset Cube

Successful: the corresponding solve in the list was updated and the label for the item in the list changed accordingly.

3.23

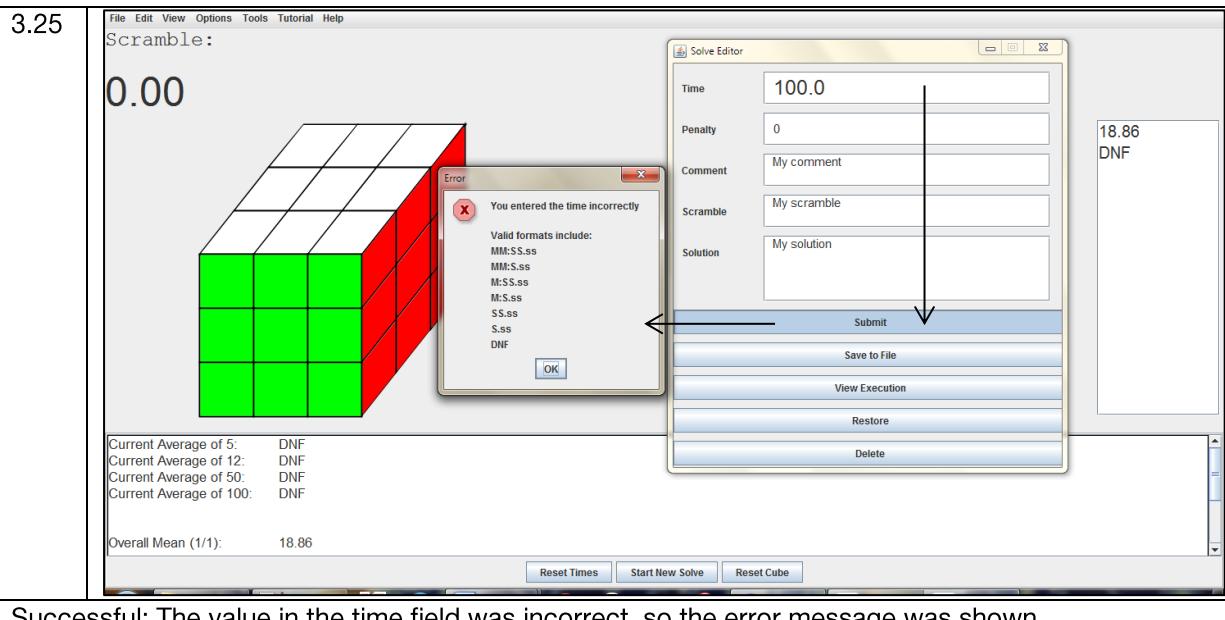
The screenshot shows a Rubik's cube interface with a solved state. A modal dialog box titled "Error" is displayed, stating "You entered the time incorrectly" and listing valid formats: MM:SS.ss, MM:S.ss, M:SS.ss, M:S.ss, S:ss, S.s, and DNF. The main application window includes a "Solve Editor" panel with fields for Time (*90), Penalty (2), Comment (My comment), Scramble (My scramble), and Solution (My solution). The "Time" field contains an invalid value. Below the editor is a table of averages and a mean of 18.86. At the bottom are buttons for Reset Times, Start New Solve, and Reset Cube.

Successful: The value in the time field was incorrect, so the error message was shown.

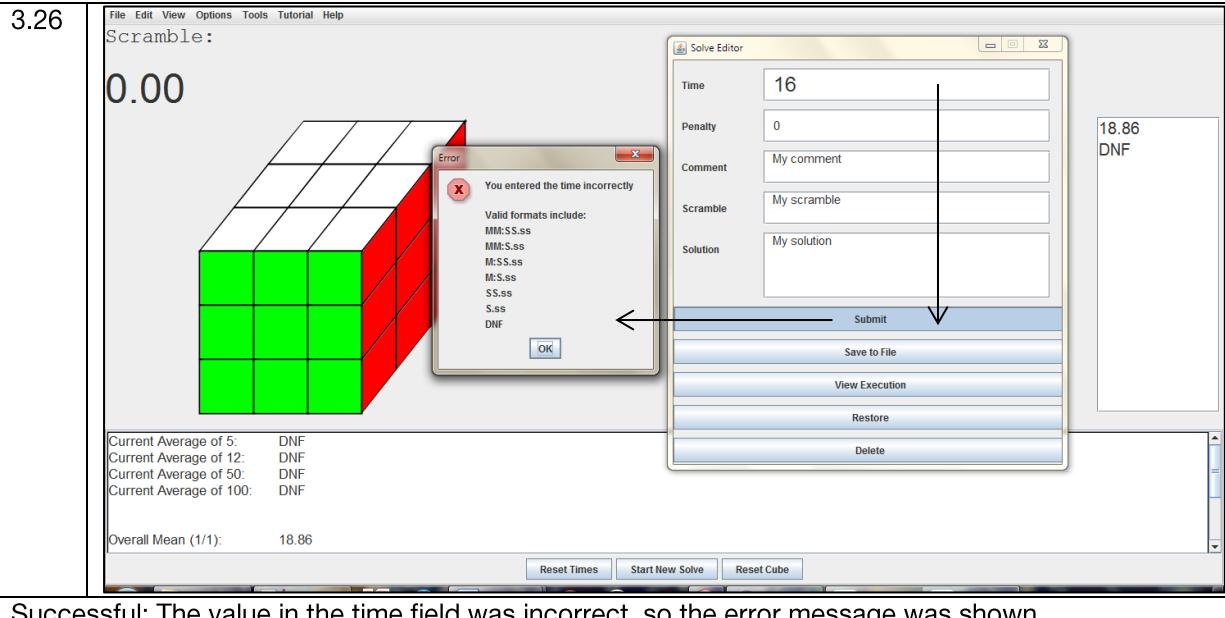
3.24

The screenshot shows a Rubik's cube interface with a solved state. A modal dialog box titled "Error" is displayed, stating "You entered the time incorrectly" and listing valid formats: MM:SS.ss, MM:S.ss, M:SS.ss, M:S.ss, S:ss, S.s, and DNF. The main application window includes a "Solve Editor" panel with fields for Time (-1.0), Penalty (0), Comment (My comment), Scramble (My scramble), and Solution (My solution). The "Time" field contains an invalid value. Below the editor is a table of averages and a mean of 18.86. At the bottom are buttons for Reset Times, Start New Solve, and Reset Cube.

Successful: The value in the time field was incorrect, so the error message was shown.



Successful: The value in the time field was incorrect, so the error message was shown.

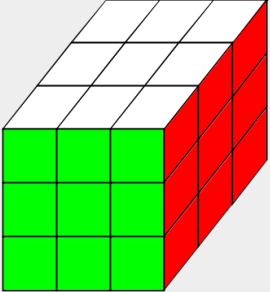


Successful: The value in the time field was incorrect, so the error message was shown.

3.27

Scramble:

0.00



Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

Overall Mean (1/1): 18.86

Reset Times Start New Solve Reset Cube

Solve Editor

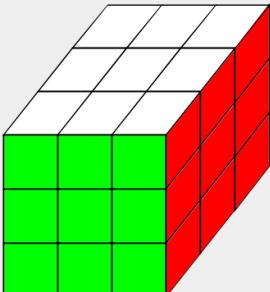
Time	99.0
Penalty	0
Comment	My comment
Scramble	My scramble
Solution	My solution

Submit Save to File View Execution Restore Delete

18.86 DNF

Scramble:

0.00



Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

Overall Mean (2/2): 58.93

Reset Times Start New Solve Reset Cube

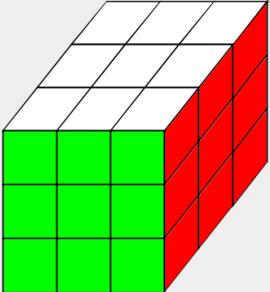
18.86
1:39.00

Successful: The corresponding solve in the list was updated, and the time was converted to the standard format MM:SS.ss

3.28

Scramble:

0.00



Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

Overall Mean (2/2): 58.93

Reset Times Start New Solve Reset Cube

Solve Editor

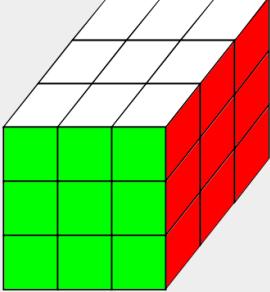
Time	0.0
Penalty	0
Comment	My comment
Scramble	My scramble
Solution	My solution

Submit
Save to File
View Execution
Restore
Delete

18.86
1:39.00
DNF

Scramble:

0.00



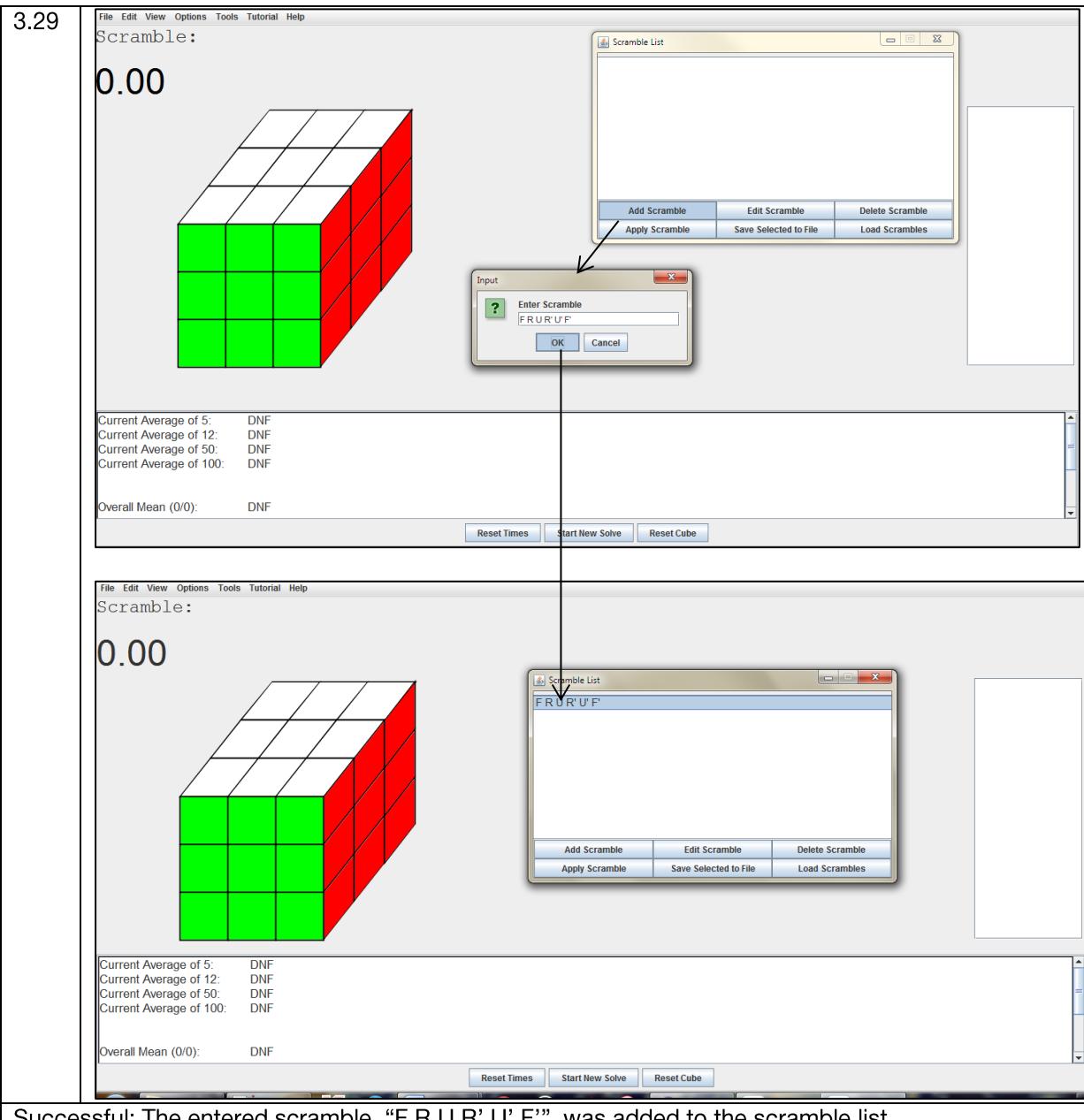
Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

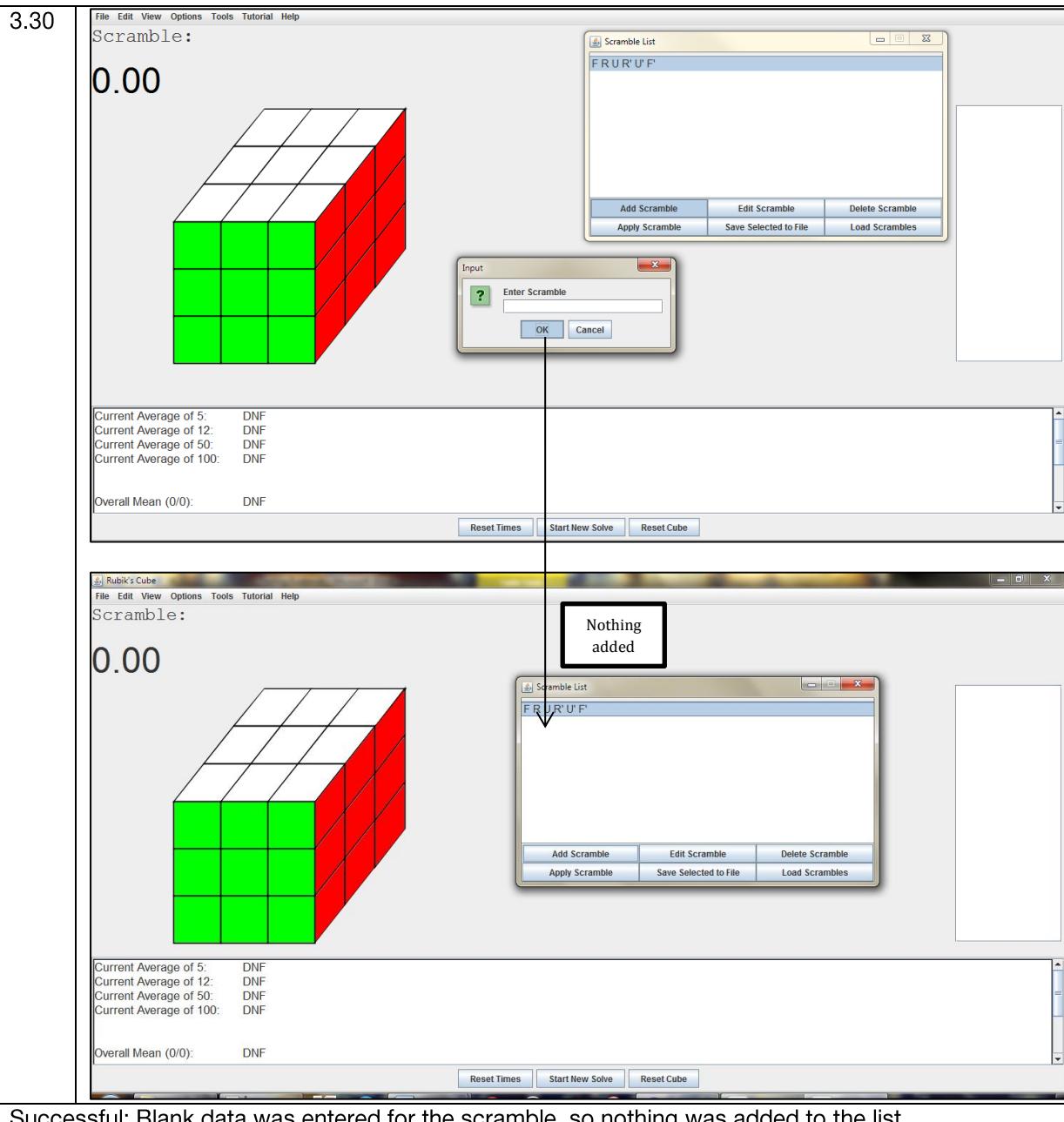
Overall Mean (3/3): 39.29

Reset Times Start New Solve Reset Cube

18.86
1:39.00
00.00

Successful: The information is valid, so the corresponding item in the list is updated.





Successful: Blank data was entered for the scramble, so nothing was added to the list.

3.31

The screenshot shows two windows: 'Solve Table' and 'Solve Form'. In the 'Solve Table' window, row 11 has a 'Date Added' value of '2014-03-00'. A cursor arrow points from this cell to a warning dialog box titled 'Error' in the foreground. The dialog box contains the message: 'Date must be valid and have the form: yyyy-MM-dd HH:mm:ss Would you like to use the current time?'. It has 'Yes' and 'No' buttons. In the 'Solve Form' window, the 'Date Added' field also contains '2014-03-00'. The 'Submit' button is visible at the bottom of the form.

Successful: the data in the *Date Added* field was incorrect, so a warning message was shown, allowing the user to use the current time or re-enter the data.

3.32

This screenshot is identical to the one above, showing the 'Solve Table' and 'Solve Form' windows. Row 11 in the 'Solve Table' has a 'Date Added' value of '2014-03-00'. A cursor arrow points from this cell to the same 'Error' dialog box in the foreground, which displays the message: 'Date must be valid and have the form: yyyy-MM-dd HH:mm:ss Would you like to use the current time?'. The 'Submit' button is visible in the 'Solve Form' window.

Successful: the data in the *Date Added* field was incorrect, so a warning message was shown, allowing the user to use the current time or re-enter the data.

3.33

The screenshot illustrates a user interface for managing member data. At the top, a 'Member Table' window displays a list of members with columns: ID, Forenames, Surname, Gender, Date of Birth, Email, and Form Class. The second window, 'Member Form', is a dialog box where new member information is entered. The third window, another 'Member Table', shows the updated list after a new entry has been submitted.

Member Table (Top Window):

ID	Forenames	Surname	Gender	Date of Birth	Email	Form Class
1	Ryan Charles	Jones	Male	24/01/2002	rjones@gmail.com	8W
2	Thomas	Smith	Male	13/12/1998	tsmith@hotmail.com	11M
3	Jack	Cooper	Male	22/05/2001	jcooper@hotmail.com	9S
4	Lee	Brown	Male	18/01/1998	lbrown@gmail.com	12R
5	Joy	Montgomery	Female	22/10/2000	jmontgomery@gmail.com	9S
7	Lily	Green	Female	14/02/1996	lgreen@yahoo.com	14T
9	Simon	Lane	Male	05/09/1995	slane@gmail.com	14R
11	Hannah	Laverty	Female	21/04/1996	hlaverty@hotmail.com	14M
12	Sarah	Rutherford	Female	28/11/1996	srutherford@gmail.com	13M
13	Sam	Middleton	Male	10/09/1999	smiddleton@gmail.com	10W

Member Form (Middle Window):

Forenames	John
Surname	Johnston
Gender	Male
Date of Birth	22/04/1996
Email	JJohnston@gmail.com
Form Class	14S

Submit

Member Table (Bottom Window):

ID	Forenames	Surname	Gender	Date of Birth	Email	Form Class
1	Ryan Charles	Jones	Male	24/01/2002	rjones@gmail.com	8W
2	Thomas	Smith	Male	13/12/1998	tsmith@hotmail.com	11M
3	Jack	Cooper	Male	22/05/2001	jcooper@hotmail.com	9S
4	Lee	Brown	Male	18/01/1998	lbrown@gmail.com	12R
5	Joy	Montgomery	Female	22/10/2000	jmontgomery@gmail.com	9S
7	Lily	Green	Female	14/02/1996	lgreen@yahoo.com	14T
9	Simon	Lane	Male	05/09/1995	slane@gmail.com	14R
11	Hannah	Laverty	Female	21/04/1996	hlaverty@hotmail.com	14M
12	Sarah	Rutherford	Female	28/11/1996	srutherford@gmail.com	13M
13	Sam	Middleton	Male	10/09/1999	smiddleton@gmail.com	10W
14	John	Johnston	Male	22/04/1996	JJohnston@gmail.com	14S

Successful: The information entered in the form was correct, so after clicking the *Submit* button, a new row containing the entered information was added to the table.

3.34

ID	Forenames	Surname	Gender	Date of Birth	Email	Form Class
1	Ryan Charles	Jones	Male	24/01/2002	rjones@gmail.com	8W
2	Thomas	Smith	Male	13/12/1998	tsmith@hotmail.com	11M
3	Jack	Cooper	Male	22/05/2001	jcooper@hotmail.com	9S
4	Lee	Brown	Male	18/01/1998	lbrown@gmail.com	12R
5	Joy	Montgomery	Female	22/10/2000	jmontgomery@gmail.com	9S
7	Lily	Green	Female	14/02/1996	lgreen@yahoo.com	14T
9	Simon	Lane	Male	05/09/1995	slane@gmail.com	14R
11	Hannah	Laverty	Female	21/04/1996	hlaverty@hotmail.com	14M
12	Sarah	Rutherford	Female	28/11/1996	srutherford@gmail.com	13M
13	Sam	Middleton	Male	10/09/1999	smiddleton@gmail.com	10W
14	John	Johnston	Male	22/04/1996	JJohnston@gmail.com	14S

Successful: The data in the form was not valid, so an error message was shown, indicating that the data in *Forenames* field was incorrect.

3.35

ID	Forenames	Surname	Gender	Date of Birth	Email	Form Class
1	Ryan Charles	Jones	Male	24/01/2002	rjones@gmail.com	8W
2	Thomas	Smith	Male	13/12/1998	tsmith@hotmail.com	11M
3	Jack	Cooper	Male	22/05/2001	jcooper@hotmail.com	9S
4	Lee	Brown	Male	18/01/1998	lbrown@gmail.com	12R
5	Joy	Montgomery	Female	22/10/2000	jmontgomery@gmail.com	9S
7	Lily	Green	Female	14/02/1996	lgreen@yahoo.com	14T
9	Simon	Lane	Male	05/09/1995	slane@gmail.com	14R
11	Hannah	Laverty	Female	21/04/1996	hlaverty@hotmail.com	14M
12	Sarah	Rutherford	Female	28/11/1996	srutherford@gmail.com	13M
13	Sam	Middleton	Male	10/09/1999	smiddleton@gmail.com	10W
14	John	Johnston	Male	22/04/1996	JJohnston@gmail.com	14S

Successful: The data in the form was not valid, so an error message was shown, indicating that the data in *Email* field was incorrect.

3.36

ID	Forenames	Surname	Gender	Date of Birth	Email	Form Class
1	Ryan Charles	Jones	Male	24/01/2002	rjones@gmail.com	8W
2	Thomas	Smith	Male	13/12/1998	tsmith@hotmail.com	11M
3	Jack	Cooper	Male	22/05/2001	jcooper@hotmail.com	9S
4	Lee	Brown	Male	18/01/1998	lbrown@gmail.com	12R
5	Joy	Montgomery	Female	22/10/2000	jmontgomery@gmail.com	9S
7	Lily	Green	Female	14/02/1996	lgreen@yahoo.com	14T
9	Simon	Lane	Male	05/09/1995	slane@gmail.com	14R
11	Hannah	Laverty	Female	21/04/1996	hlaverty@hotmail.com	14M
12	Sarah	Rutherford	Female	28/11/1996	srutherford@gmail.com	13M
13	Sam	Middleton	Male	10/09/1999	smiddleton@gmail.com	10W
14	John	Johnston	Male	22/04/1996	JJohnston@gmail.com	14S

Successful: The data in the form was not valid, so an error message was shown, indicating that the data in *Date of Birth* field was incorrect.

3.37

ID	Forenames	Surname	Gender	Date of Birth	Email	Form Class
1	Ryan Charles	Jones	Male	24/01/2002	rjones@gmail.com	8W
2	Thomas	Smith	Male	13/12/1998	tsmith@hotmail.com	11M
3	Jack	Cooper	Male	22/05/2001	jcooper@hotmail.com	9S
4	Lee	Brown	Male	18/01/1998	lbrown@gmail.com	12R
5	Joy	Montgomery	Female	22/10/2000	jmontgomery@gmail.com	9S
7	Lily	Green	Female	14/02/1996	lgreen@yahoo.com	14T
9	Simon	Lane	Male	05/09/1995	slane@gmail.com	14R
11	Hannah	Laverty	Female	21/04/1996	hlaverty@hotmail.com	14M
12	Sarah	Rutherford	Female	28/11/1996	srutherford@gmail.com	13M
13	Sam	Middleton	Male	10/09/1999	smiddleton@gmail.com	10W
14	John	Johnston	Male	22/04/1996	JJohnston@gmail.com	14S

Successful: The data in the form was not valid, so an error message was shown, indicating that the data in *Form Class* field was incorrect.

3.38

The figure consists of three windows arranged vertically. The top window is titled "Member-Competition" and contains a table with columns: Name, Member ID, Rank, Average, Time 1, Time 2, Time 3, Time 4, and Time 5. The data includes entries for Lily Green, Hannah Laverty, Thomas Smith, Ryan Charles Jones, Joy Montgomery, Lee Brown, and Simon Lane. The middle window is titled "Member-Competition Form" and contains fields for Member ID (3), Time 1 (14.20), Time 2 (13.25), Time 3 (14.16), Time 4 (13.89), and Time 5 (12.79). A "Submit" button is at the bottom. The bottom window is also titled "Member-Competition" and shows the same table as the top window, but now includes a new row for "Jack Cooper" with Member ID 3, Rank 2, and Average 13.77. Arrows indicate the flow from the form to the table.

Name	Member ID	Rank	Average	Time 1	Time 2	Time 3	Time 4	Time 5
Lily Green	7	1	13.18	13.25	13.64	13.02	13.28	12.56
Hannah Laverty	11	2	16.42	16.52	16.78	16.42	16.31	16.00
Thomas Smith	2	3	16.61	16.42	16.51	16.89	20.56	16.10
Ryan Charles Jones	1	4	20.36	20.27	21.30	21.22	19.58	18.49
Joy Montgomery	5	5	25.48	25.14	26.28	25.64	25.66	25.13
Lee Brown	4	6	38.17	35.40	32.16	38.90	40.20	41.70
Simon Lane	9	7	40.66	40.78	45.25	36.29	38.51	42.70

Successful: A row containing the entered information was added to the table, the name 'Jack Cooper' was displayed, and the average of 5 was calculated for the corresponding row.

3.39

Member-Competition Form

Member ID	12
Time 1	
Time 2	0.00
Time 3	0.00
Time 4	0.00
Time 5	0.00

Submit

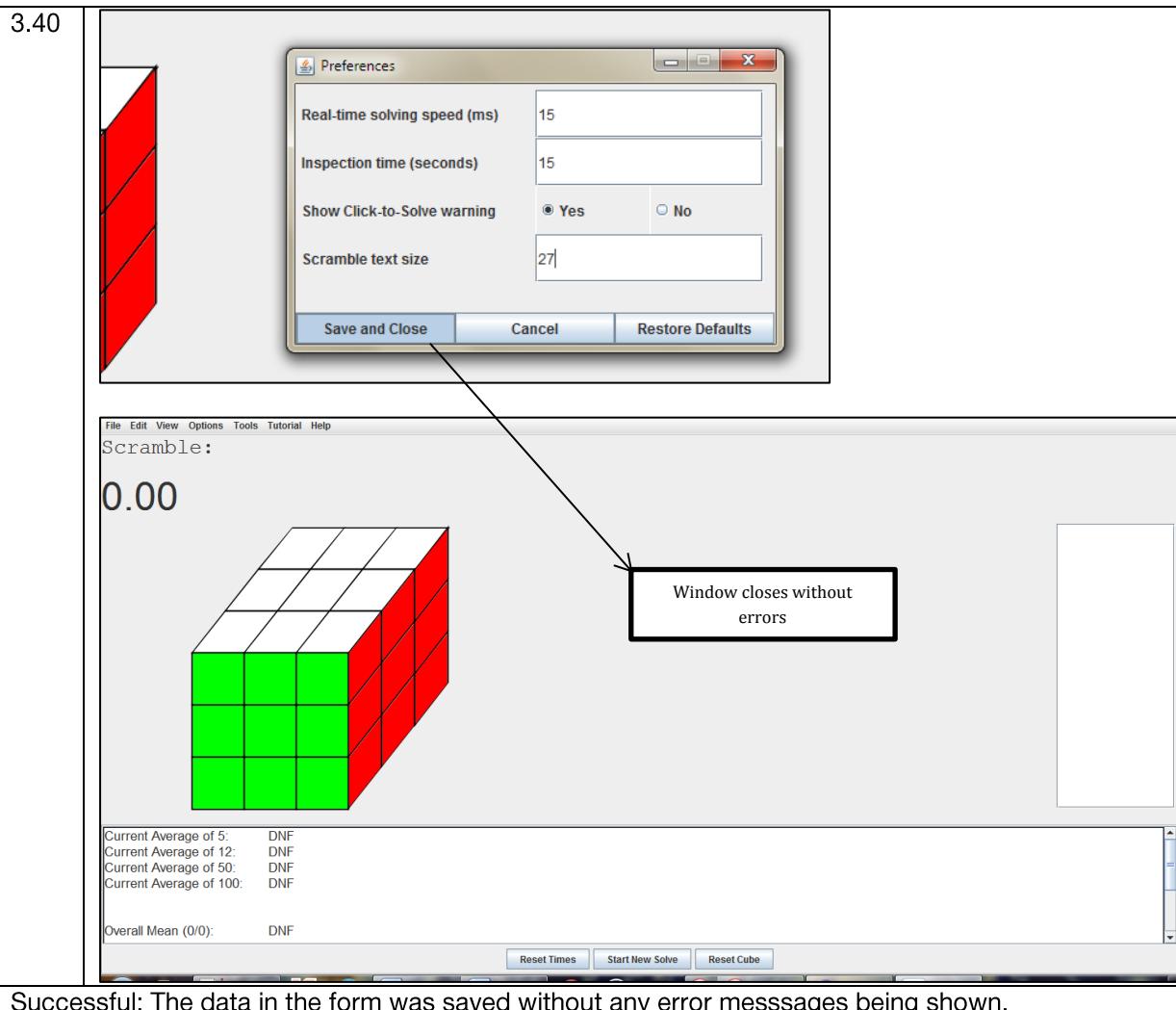
Member-Competition Form

Member ID	12
Time 1	
Time 2	0.00
Time 3	0.00
Time 4	0.00
Time 5	0.00

Some of your times are invalid

Submit

Successful: The *Time 1* field was left blank, so the error message was shown at the bottom of the window.



3.41

Successful: The data in the *Real-time solving speed (ms)* field was invalid, so its background turned red and the window did not close.

3.42

The figure consists of two screenshots of a software's 'Preferences' dialog box. Both screenshots show the same four configuration options: 'Real-time solving speed (ms)', 'Inspection time (seconds)', 'Show Click-to-Solve warning', and 'Scramble text size'. In the top screenshot, the 'Inspection time (seconds)' field contains the valid numerical value '15'. In the bottom screenshot, the same field contains the invalid text 'fifteen', which is highlighted with a red background. Arrows from the text 'Successful:' and the explanatory text below point to this red-highlighted field. The 'Save and Close' button at the bottom left of both windows is highlighted with a blue rectangle.

Setting	Value in Top Screenshot	Value in Bottom Screenshot
Real-time solving speed (ms)	15	15
Inspection time (seconds)	fifteen	fifteen
Show Click-to-Solve warning	<input checked="" type="radio"/> Yes	<input checked="" type="radio"/> Yes
Scramble text size	27	27

Successful: The data in the *Inspection Time (seconds)* field was invalid, so its background turned red and the window did not close.

3.43

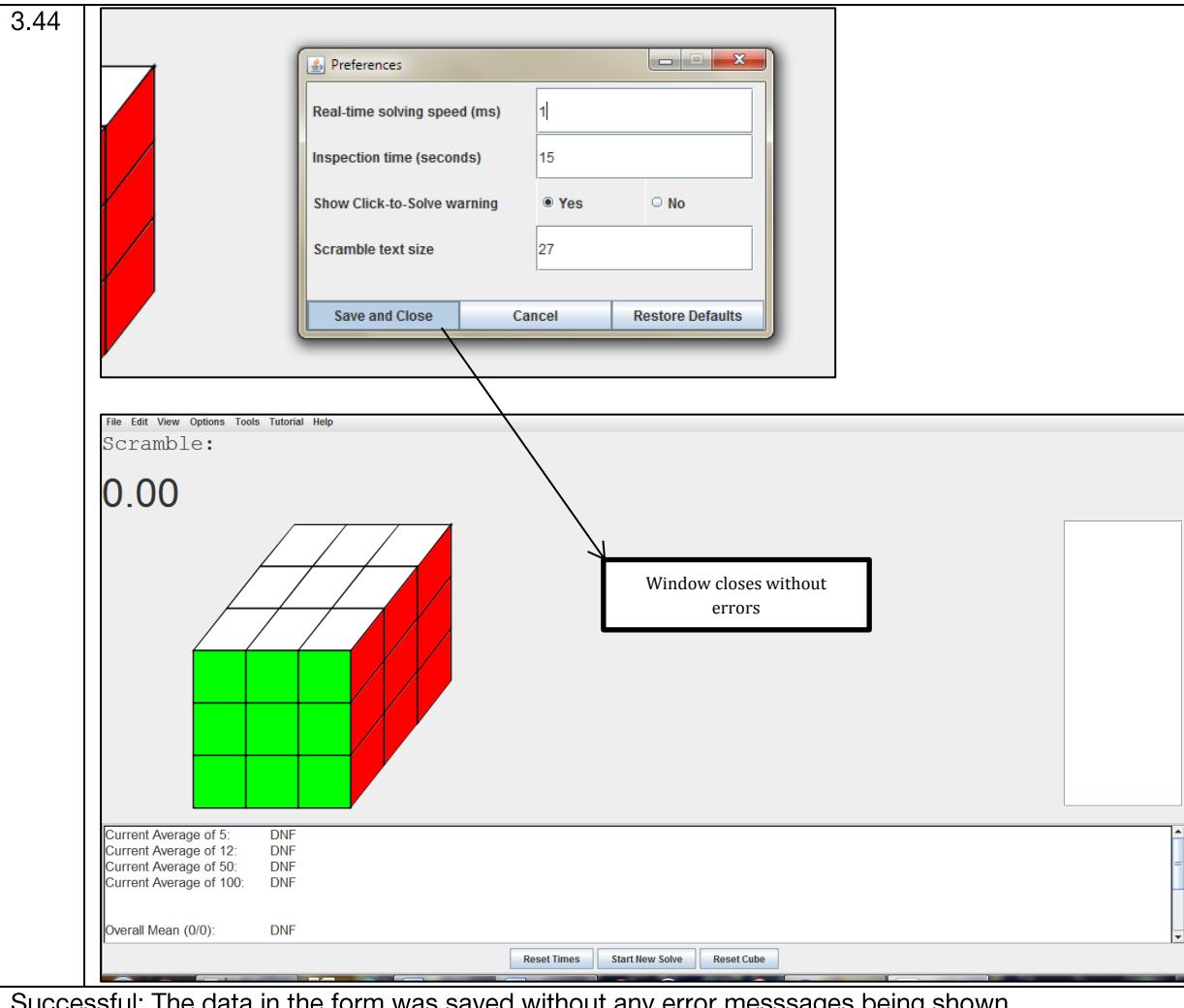
The figure consists of two screenshots of a 'Preferences' dialog box. Both screenshots show the following configuration:

- Real-time solving speed (ms): 15
- Inspection time (seconds): 15
- Show Click-to-Solve warning: Yes (radio button selected)
- Scramble text size: large

In the first screenshot, a red arrow points from the 'large' entry in the 'Scramble text size' field to the 'Save and Close' button at the bottom of the window.

In the second screenshot, the 'Scramble text size' field is highlighted with a red background, and the 'Save and Close' button is also highlighted with a red background, indicating that the window did not close successfully due to the invalid input.

Successful: The data in the *Scramble text size* field was invalid, so its background turned red and the window did not close.



3.45

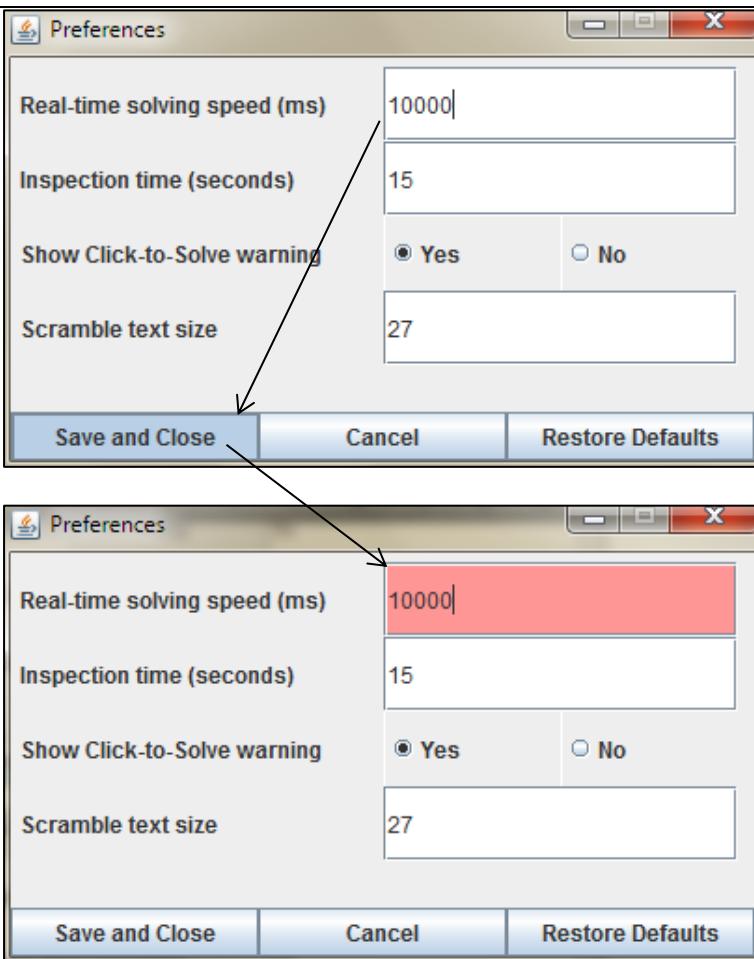
The figure consists of two vertically stacked screenshots of a 'Preferences' dialog box. Both screenshots show the same four configuration options: 'Real-time solving speed (ms)', 'Inspection time (seconds)', 'Show Click-to-Solve warning', and 'Scramble text size'. The 'Real-time solving speed (ms)' field contains '0' in both cases. In the top screenshot, the 'Inspection time (seconds)' field contains '15', the 'Show Click-to-Solve warning' section has radio buttons for 'Yes' (selected) and 'No', and the 'Scramble text size' field contains '27'. In the bottom screenshot, the 'Inspection time (seconds)' field contains '15', the 'Show Click-to-Solve warning' section has radio buttons for 'Yes' (selected) and 'No', and the 'Scramble text size' field contains '27'. Arrows from the text 'Successful:' point to the 'Real-time solving speed (ms)' fields in both screenshots. A note below the second screenshot states: 'Successful: The data in the Real-time solving speed (ms) field was invalid, so its background turned red and the window did not close.'

Real-time solving speed (ms)	0
Inspection time (seconds)	15
Show Click-to-Solve warning	<input checked="" type="radio"/> Yes <input type="radio"/> No
Scramble text size	27

Real-time solving speed (ms)	0
Inspection time (seconds)	15
Show Click-to-Solve warning	<input checked="" type="radio"/> Yes <input type="radio"/> No
Scramble text size	27

Successful: The data in the *Real-time solving speed (ms)* field was invalid, so its background turned red and the window did not close.

3.46

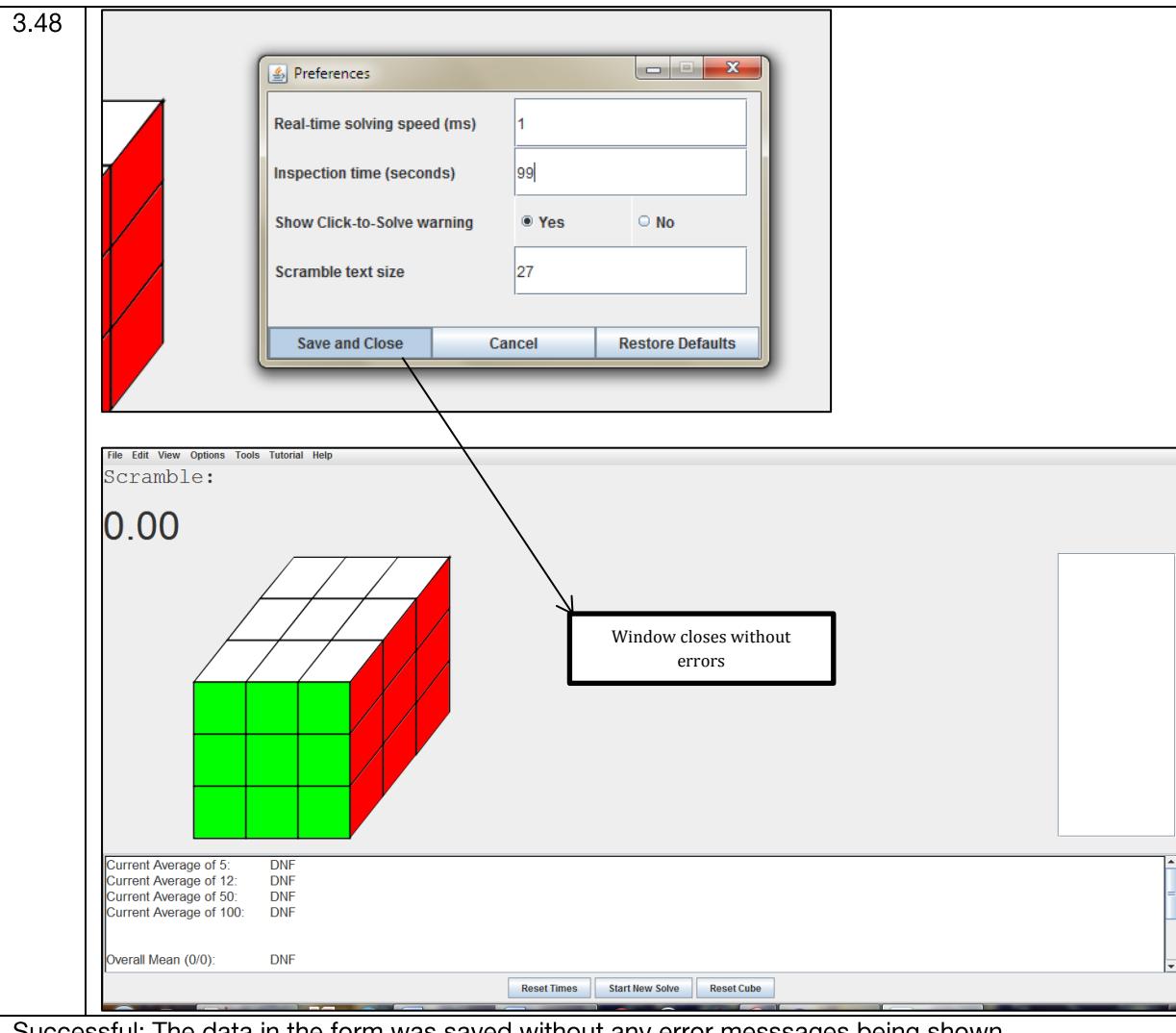


Successful: The data in the *Real-time solving speed (ms)* field was invalid, so its background turned red and the window did not close.

3.47

The figure consists of two screenshots of a software's 'Preferences' dialog box. Both screenshots show the same four configuration options: 'Real-time solving speed (ms)', 'Inspection time (seconds)', 'Show Click-to-Solve warning', and 'Scramble text size'. In the top screenshot, all values are valid: 'Real-time solving speed' is set to '1', 'Inspection time' is set to '0', 'Scramble text size' is set to '27', and the 'Yes' radio button is selected for 'Show Click-to-Solve warning'. In the bottom screenshot, the 'Inspection time (seconds)' field contains an invalid value, '0', which has caused the entire row to turn red. The other fields and settings remain the same.

Successful: The data in the *Inspection time (seconds)* field was invalid, so its background turned red and the window did not close.



3.49

The figure consists of two vertically stacked screenshots of a software's 'Preferences' dialog window. Both windows have a title bar 'Preferences' and three buttons at the bottom: 'Save and Close' (highlighted in blue), 'Cancel', and 'Restore Defaults'.
The top window shows the following settings:

- 'Real-time solving speed (ms)': 1
- 'Inspection time (seconds)': 100
- 'Show Click-to-Solve warning': Yes (No)
- 'Scramble text size': 27

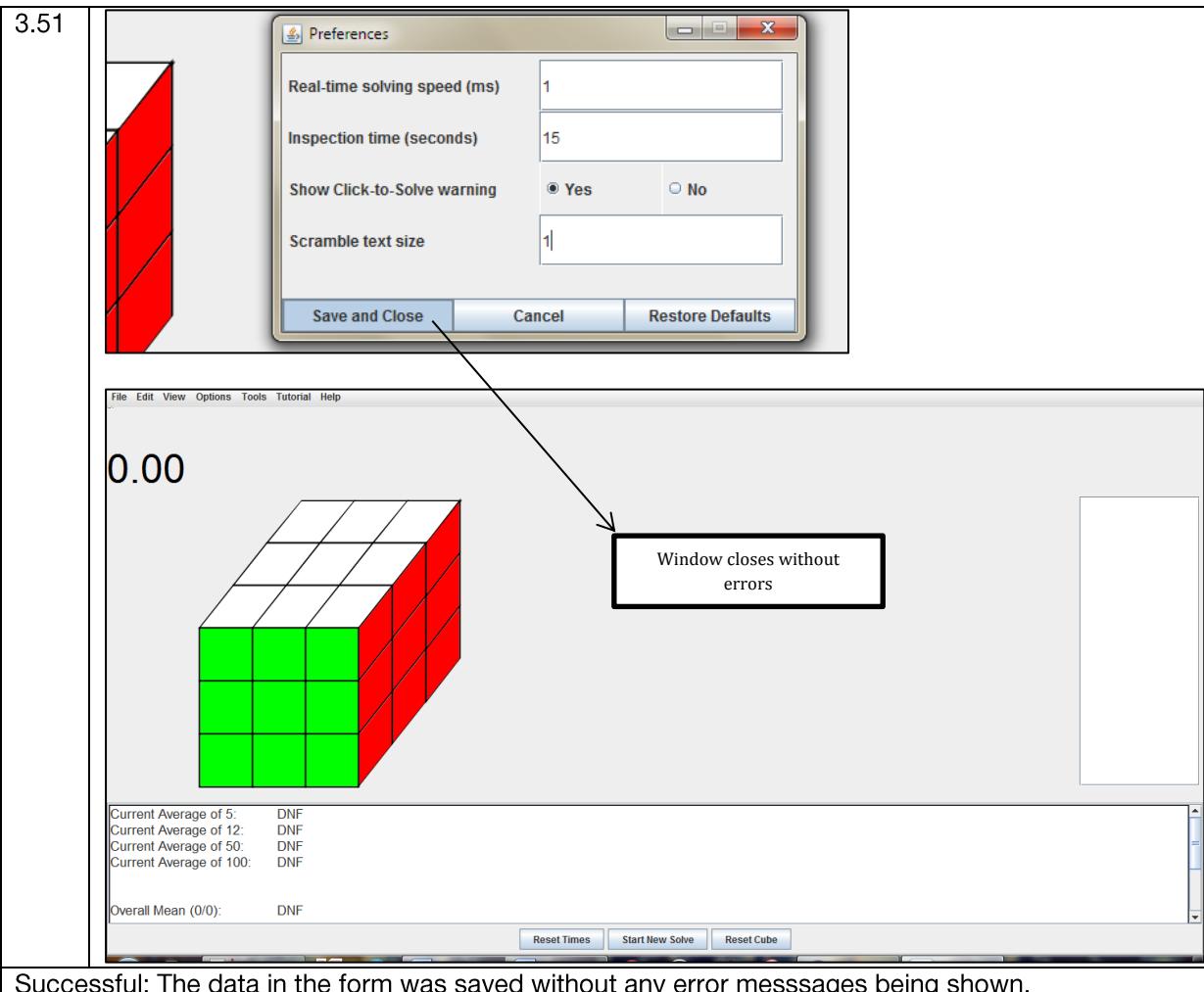
The bottom window shows the same settings, but the 'Inspection time (seconds)' field is highlighted with a red background, indicating an error. The value '100' is still present in the field.

Successful: The data in the *Inspection time (seconds)* field was invalid, so its background turned red and the window did not close.

3.50

The figure consists of two screenshots of a 'Preferences' dialog box. Both screenshots show the same four settings: 'Real-time solving speed (ms)', 'Inspection time (seconds)', 'Show Click-to-Solve warning', and 'Scramble text size'. In the top screenshot, all values are valid: 'Real-time solving speed' is 1, 'Inspection time' is 15, and 'Scramble text size' is 0. In the bottom screenshot, the 'Scramble text size' field contains the invalid value '0', which is highlighted with a red background. The 'Save and Close' button is highlighted in both cases, indicating it was clicked. The 'Cancel' and 'Restore Defaults' buttons are also visible.

Successful: The data in the *Scramble text size* field was invalid, so its background turned red and the window did not close.



Successful: The data in the form was saved without any error messages being shown.

3.52

ID	Time	Penalty	Comment	Scramble	Solution	Date Added
9	12.19	0		L' D' U' R' U' D ...	x2 U' L' 2 R' U' R' ...	2014-03-08 20...
8	12.29	0	Easy	F' B' R' 2 U' B F ...	y' x2 R' F' 2 D2 y ...	2014-03-08 20...
26	14.36	0		L' R' 2 D F' 2 R' D ...	x2 y L' U' R' F' ...	2014-03-08 20...
11	14.46	0		D' F' D' 2 R' 2 F' ...	y x2 y D' U' R' F' ...	2014-03-08 20...
12	15.31	0		L2 U' 2 R' L' 2 U' ...	x2 D' R' 2 y' R' U' ...	2014-03-08 20...
2	16.37	0	PLL Skip	D' F' D' R' D' U' ...	x2 y L' U' R' F' ...	2014-03-08 20...
27	16.37	0		D' U' R' U' B F ...	x2 R' B' R' 2 F D ...	2014-03-08 22...
13	16.43	0		R' D' U' R' U' B F ...	x2 R' B' R' 2 F D ...	2014-03-08 22...
15	17.01	0		L2 U' R' D' 2 U' ...	x2 L' F' D' R' D' ...	2014-03-08 20...
28	18.81	0		U' B' F' L' R' 2 U' ...	x2 y L' F' D' R' D' ...	2014-03-08 20...
7	19.29	0		F' 2 R' U' L' 2 U' B ...	x2 y D' R' 2 D2 ...	2014-03-08 20...
14	19.50	0		B' R' B' L' R' D' 2 ...	y x2 y D' L' R' U' ...	2014-03-08 20...
10	20.40	0	Bad cross	F' R' D' R' U' L' ...	x2 y 2 F' D2 U' ...	2014-03-08 20...
31	21.57	0		D2 L' B2 F2 D2 ...	y2 x2 y' R2 F' B' ...	2014-03-08 22...
30	21.73	0		L' D' B D' U' F2 D2 ...	x2 y' D' U' L' F' ...	2014-03-08 22...
6	31.11	0		B' F' L' D2 L2 U' ...	x2 y' D' R' F' D' ...	2014-03-08 20...

Successful: The rows were sorted according to the time column, with the fastest time first and the slowest time last, and all other attributes were moved with their corresponding time.

3.53

Solve Table

Sorting Filter

ID	Time	Penalty	Comment	Scramble	Solution	Date Added
27	16.37	0		R' D' U R U B F ...	x2 R' B' R2 F D y ...	2014-03-08 22:16:24
30	21.73	0		L D B D U F2 D2 ...	x2 y D' U2 L' F' B y ...	2014-03-08 22:16:24
31	21.57	0		D2 L B2 F2 D2 F ...	y2 x2 y' R2 F B' R ...	2014-03-08 22:16:24
26	14.36	0		L' R2 D F2 R' D' F ...	x2 y L U R' F B' y ...	2014-03-08 20:50:51
7	19.29	0		F2 R' U' L2 U' B R ...	x2 y2 D R2 D2 R2 F' ...	2014-03-08 20:33:16
8	12.29	0	Easy	F' B' R2 U2 B F D ...	y' x2 R' F2 D2 y' R' ...	2014-03-08 20:33:16
9	12.19	0		L' D' U2 R U' D L2 ...	x2 U' L2 R' U' R' F ...	2014-03-08 20:33:16
1	18.81	0		U B' F' L' R2 U2 F' ...	x2 y R2 M2 U2 M2 ...	2014-03-08 20:33:16
2	16.37	0	PLL Skip	D' F' D' R D U L2 U ...	x2 y2 F D2 U2 R' F ...	2014-03-08 20:33:16
6	31.11	0		B' F' L' D2 U2 L' ...	x2 y' D' R F y' D F y ...	2014-03-08 20:33:16
13	16.43	0		U' F D' U' R' U' F' B ...	x2 y B' U' R' F U L2 ...	2014-03-08 20:33:16
14	19.50	0		B' R' B' L' R' D2 F ...	y' x2 y D L' R' U' R' ...	2014-03-08 20:33:16
15	17.01	0		L2 U R' D2 U2 F' U ...	x2 L' F' D' R' D' R D ...	2014-03-08 20:33:16
11	14.46	0	Bad cross	F' R D R U2 L2 F' ...	x2 y' D R' B' R' y' ...	2014-03-08 20:33:16
12	15.31	0		D F' D2 R2 F' R' F' ...	y x2 y D U R' F' L B ...	2014-03-08 20:33:16

Add Solve Edit Solve Delete Solve Load into Program

Current Average of 100: DNF

Overall Mean (0/0): DNF

Reset Times Start New Solve Reset Cube

Solved (Descending)

Successful: The rows were sorted according to the date column, with the most recent time first and the oldest time last, and all other attributes were moved with their corresponding date.

3.54

Solve Table

Sorting | Filter

ID	Time	Penalty	Comment	Scramble	Solution	Date Added
1	8.81	0		U B' F' L' R2 U2 ... x2 y' R2 M2 U2 ...	2014-03-08 20...	
2	6.37	0	PLL Skip	D' F D' R D U L... x2 y' F D2 U2 ...	2014-03-08 20...	
6	1.11	0		B' F L' D2 L2 U... x2 y' D' R F y' D...	2014-03-08 20...	
7	9.29	0		F2 R' U' L2 U' B... x2 y' D2 R2 D2 ...	2014-03-08 20...	
8	2.29	0	Easy	F B' R2 B2 F ... x2 y' x2 R' F2 D2 y...	2014-03-08 20...	
9	2.19	0		L' D' U2 R U D ... x2 y' L2 R' U' R' ...	2014-03-08 20...	
10	0.40	0	Bad cross	F' R D R U2 L2 ... x2 y' D R' B' R' ...	2014-03-08 20...	
11	4.46	0		D' F D' R2 F' ... x2 y' D U R' F' ...	2014-03-08 20...	
12	6.31	0		L2 U2 R L' F2 U... x2 D' R2 y' R' U ...	2014-03-08 20...	
13	6.43	0		U' F D' U' R' U' ... x2 y' B U' R' F' ...	2014-03-08 20...	
14	9.50	0		B' R' B' L' R' D2 ... x2 y' D L R' U' ...	2014-03-08 20...	
15	7.01	0		L2 U R' D2 U ... x2 L F' D' R' D' ...	2014-03-08 20...	
26	4.36	0		L' R2 D F2 R' D... x2 y' L U R' F B' ...	2014-03-08 20...	
27	6.37	0		R' D' U R U B F... x2 R' B' R2 F D ...	2014-03-08 22...	
30	1.73	0		L D B D U F2 D ... x2 y' D' U2 L F' ...	2014-03-08 22...	
6	1.11	0		B' F L' D2 L2 U... x2 y' D' R F y' D ...	2014-03-08 20...	

Add Solve Edit Solve Delete Solve Load into Program

Current Average of 100: DNF

Overall Mean (0/0): DNF

Reset Times Start New Solve Reset Cube

Sorted (Ascending)

Sorting | Filter

ID	Time	Penalty	Comment	Scramble	Solution	Date Added
1	8.81	0		U B' F' L' R2 U2 ... x2 y' R2 M2 U2 ...	2014-03-08 20...	
2	6.37	0	PLL Skip	D' F D' R D U L... x2 y' F D2 U2 ...	2014-03-08 20...	
6	1.11	0		B' F L' D2 L2 U... x2 y' D' R F y' D...	2014-03-08 20...	
7	9.29	0		F2 R' U' L2 U' B... x2 y' D2 R2 D2 ...	2014-03-08 20...	
8	2.29	0	Easy	F B' R2 B2 F ... x2 y' x2 R' F2 D2 y...	2014-03-08 20...	
9	2.19	0		L' D' U2 R U D ... x2 y' L2 R' U' R' ...	2014-03-08 20...	
10	0.40	0	Bad cross	F' R D R U2 L2 ... x2 y' D R' B' R' ...	2014-03-08 20...	
11	4.46	0		D' F D' R2 F' ... x2 y' D U R' F' ...	2014-03-08 20...	
12	6.31	0		L2 U2 R L' F2 U... x2 D' R2 y' R' U ...	2014-03-08 20...	
13	6.43	0		U' F D' U' R' U' ... x2 y' B U' R' F' ...	2014-03-08 20...	
14	9.50	0		B' R' B' L' R' D2 ... x2 y' D L R' U' ...	2014-03-08 20...	
15	7.01	0		L2 U R' D2 U ... x2 L F' D' R' D' ...	2014-03-08 20...	
26	4.36	0		L' R2 D F2 R' D... x2 y' L U R' F B' ...	2014-03-08 20...	
27	6.37	0		R' D' U R U B F... x2 R' B' R2 F D ...	2014-03-08 22...	
30	1.73	0		L D B D U F2 D ... x2 y' D' U2 L F' ...	2014-03-08 22...	
6	1.11	0		B' F L' D2 L2 U... x2 y' D' R F y' D ...	2014-03-08 20...	

Add Solve Edit Solve Delete Solve Load into Program

Current Average of 100: DNF

Overall Mean (0/0): DNF

Reset Times Start New Solve Reset Cube

Successful: The rows were sorted according to the ID column, with the smallest ID first and the largest ID last, and all other attributes were moved with their corresponding ID.

3.55

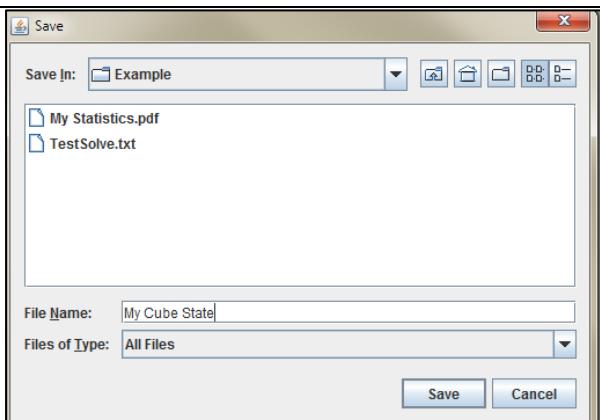
The screenshot shows a software application window titled "Solve Table". At the top, there are two overlapping "Input" dialogs. The first dialog has the title "Enter lower time boundary" and contains the value "13.21" in a text field. The second dialog has the title "Enter lower time boundary" and contains the value "21.30" in a text field. Both dialogs have "OK" and "Cancel" buttons. Below the dialogs is a table titled "Solve Table" with columns: ID, Time, Penalty, Comment, Scramble, Solution, and Date Added. The table contains the following data:

ID	Time	Penalty	Comment	Scramble	Solution	Date Added
15	13.22	0	Fast	L2 U R' D2 U2 ...	x2 L F' D' R D' ...	2014-02-13 14:...
37	13.22	0	Fast	L2 U R' D2 U2 ...	x2 L F' D' R D' ...	2014-02-13 14:...
14	19.50	0		B R' B L' R' D2 ...	y' x2 y D L R' U'...	2014-03-08 20:...
7	20.00					2014-03-18 20:...
44	21.20					2014-03-23 19:...

At the bottom of the table are four buttons: "Add Solve", "Edit Solve", "Delete Solve", and "Load into Program".

Successful: Only the times between 13.21 and 21.30 were shown in the table.

3.56



Successful: The save dialog opened, allowing the user to choose a location to save the file. After clicking save, the window closed and the file was saved in the chosen location.

3.57

Solve Table

ID	Time	Penalty	Comment	Scramble	Solution	Date Added
1	18.81	0		U' B' F' L' R2 U2 F' D ...	x2 y' R2 M2 U2 M2 y' ...	2014-03-08 20:33:16
2	16.37	0	PLL Skip	D' F D' R D U L2 U B' ...	x2 y' F D2 U2 R' F R ...	2014-03-08 20:33:16
3	18.44	0		U' D2 R2 L' U' F2 B L ...	x2 U' F' F B' R2 L2 D ...	2014-03-08 20:33:16
4	17.75	0		L' D' U' F D2 U2 B R2 ...	y x2 y D L R F R2 D ...	2014-03-08 20:33:16
5	17.33	0		R2 B' F2 R2 B2 R' U F' ...	x2 D' R' B' D' y' L U ...	2014-03-08 20:33:16
6	31.11	0		B' F' L' D2 L2 U' L2 B ...	x2 y' D' R F y' D F y L ...	2014-03-08 20:33:16
7	19.29	0		F2 R' U' L2 U' B R U ...	x2 y' D R2 D2 R2 F' y ...	2014-03-08 20:33:16
8	12.29	0	Easy	F' B' R2 U2 B' F D B2 ...	y' x2 R' F2 D2 y' R' U' ...	2014-03-08 20:33:16
9	12.19	0	Bad cross	L' D' U' 2 R U' D L2 R ...	x2 U' L2 R' U' R' F y' R ...	2014-03-08 20:33:16
10	20.40	0		F' R D R U2 L2 F' L' B ...	x2 y' D R' B' R' y' U R ...	2014-03-08 20:33:16
11	14.46	0		D' F' D2 R2 F' R' F' D' ...	y x2 y D U R' F L B2 ...	2014-03-08 20:33:16
12	15.31	0		L2 U2 R L' F2 U B' R2 ...	x2 D' R2 y' R' U' R' F y ...	2014-03-08 20:33:16
13	16.43	0		U' F D U' R' U' F' B' R ...	x2 y' B U' R' F U L2 U ...	2014-03-08 20:33:16
14	19.50	0		B' R' B' L' R' D2 F' R' B ...	y' x2 y D L R' U' R' F ...	2014-03-08 20:33:16
15	17.01	0		L2 U' R' D2 U2 F' U2 ...	x2 L F' D' R' D2 y ...	2014-03-08 20:33:16
26	14.36	0		L' R2 D F2 R' D' F2 R ...	x2 y L U R' F B' y' U ...	2014-03-08 20:50:51

Add Solve Edit Solve Delete Solve Load into Program

File **Edit** **View** **Options** **Tools** **Tutorial** **Help**

Save Cube-State - txt
Save Statistics - pdf
Save Session to Database
Load Cube-State - txt
Load Solve Information - txt
Exit

L B2 F2 D2 F' L R F' U2 F' U B R B F' U' F' R' F' D' B' U' B2 R

16.37
17.06
17.22
21.73
21.57

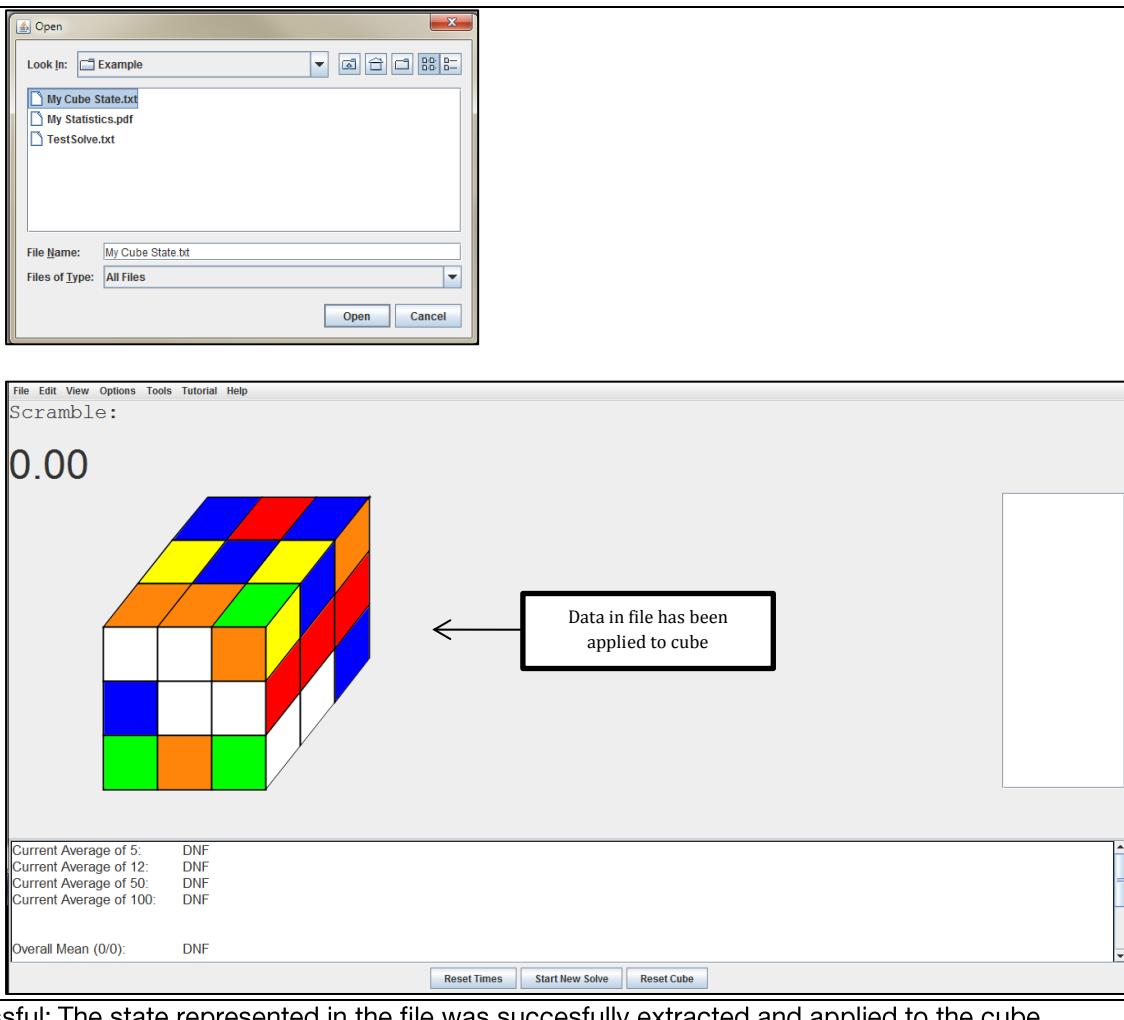
Solve Table

ID	Time	Penalty	Comment	Scramble	Solution	Date Added
1	18.81	0		U' B' F' L' R2 U2 F' D ...	x2 y' R2 M2 U2 M2 y' ...	2014-03-08 20:33:16
2	16.37	0	PLL Skip	D' F D' R D U L2 U B' ...	x2 y' F D2 U2 R' F R ...	2014-03-08 20:33:16
3	18.44	0		U' D2 R2 L' U' F2 B L ...	x2 U' F' F B' R2 L2 D ...	2014-03-08 20:33:16
4	17.75	0		L' D' U' F D2 U2 B R2 ...	y x2 y D L R F R2 D ...	2014-03-08 20:33:16
5	17.33	0		R2 B' F2 R' B2 R' U F' ...	x2 D' R' B' D' y' L U ...	2014-03-08 20:33:16
6	31.11	0		B' F' L' D2 L2 U' L2 B ...	x2 y' D' R F y' D F y L ...	2014-03-08 20:33:16
7	19.29	0		F2 R' U' L2 U' B R U ...	x2 y' D R2 D2 R2 F' y ...	2014-03-08 20:33:16
8	12.29	0	Easy	F' B' R2 U2 B' F D B2 ...	y' x2 R' F2 D2 y' R' U' ...	2014-03-08 20:33:16
9	12.19	0		L' D' U' 2 R U' D L2 R ...	x2 U' L2 R' U' R' F y' R ...	2014-03-08 20:33:16
10	20.40	0	Bad cross	F' R D R U2 L2 F' L' B ...	x2 y' D R' B' R' y' U R ...	2014-03-08 20:33:16
11	14.46	0		D' F' D2 R2 F' R' F' D' ...	y x2 y D U R' F L B2 ...	2014-03-08 20:33:16
12	15.31	0		L2 U2 R L' F2 U B' R2 ...	x2 D' R2 y' R' U' R' F y ...	2014-03-08 20:33:16
13	16.43	0		U' F D U' R' U' F' B' R ...	x2 y' B U' R' F U L2 U ...	2014-03-08 20:33:16
14	19.50	0		B' R' B' L' R' D2 F' R' B ...	y' x2 y D L R' U' R' F ...	2014-03-08 20:33:16
15	17.01	0		L2 U' R' D2 U2 F' U2 ...	x2 L F' D' R' D2 y ...	2014-03-08 20:33:16
26	14.36	0		L' R2 D F2 R' D' F2 R ...	x2 y L U R' F B' y' U ...	2014-03-08 20:50:51
27	16.37	0		R' D' U R U B2 F2 R2 ...	x2 R' B' R2 F D y D y ...	2014-03-08 22:16:24
28	17.06	0		R2 L' U' B' F' D' B' F' ...	x2 y' R' D' R' y' R2 F' y ...	2014-03-08 22:16:24
29	17.22	0		F B D F' R' B' L F R2 ...	x2 y' R' D' L' B' y' D R ...	2014-03-08 22:16:24
30	21.73	0		L D B D U F2 D2 U B' ...	x2 y' D' U2 L F' B y F' ...	2014-03-08 22:16:24
31	21.57	0		D2 L B2 F2 D2 F' L R ...	y2 x2 y' R2 F B' R y2 ...	2014-03-08 22:16:24

Add Solve Edit Solve Delete Solve Load into Program

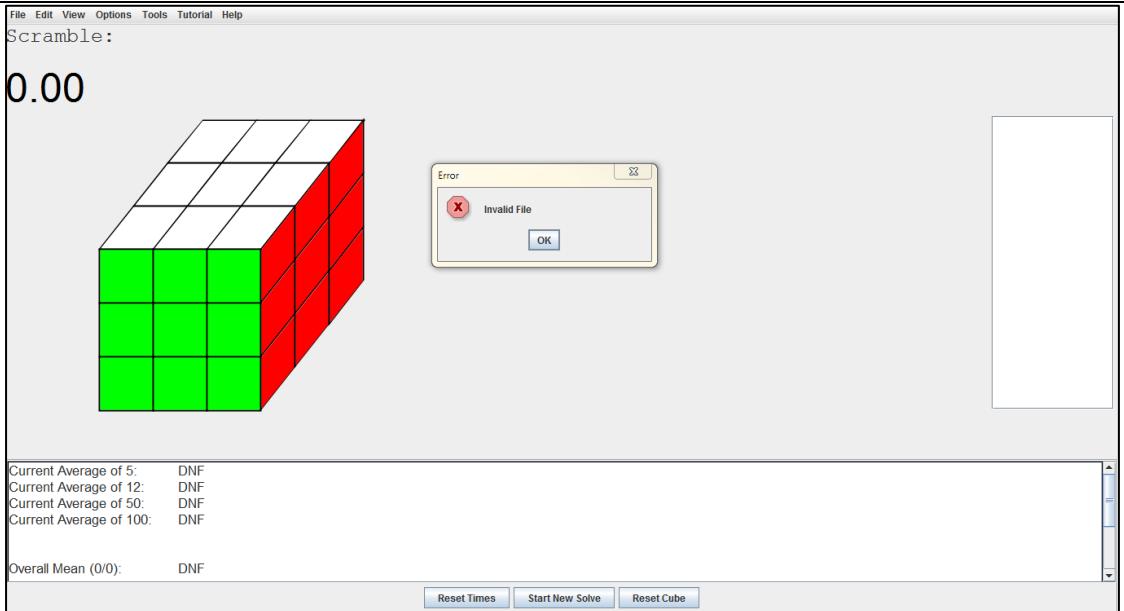
Successful: The solves in the list were appended to the Solve Table as requested (the appended solves are shown in the black rectangle).

3.58



Successful: The state represented in the file was successfully extracted and applied to the cube.

3.59

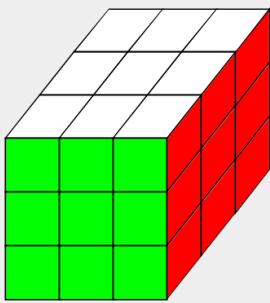


Successful: The data in the file could not be extracted successfully since the file was invalid, so the error message was shown.

3.60

Scramble:

0.00



Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

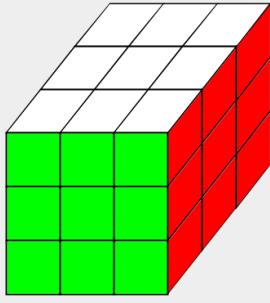
Overall Mean (0/0): DNF

Reset Times Start New Solve Reset Cube

File Edit View Options Tools Tutorial Help

Scramble:

0.00



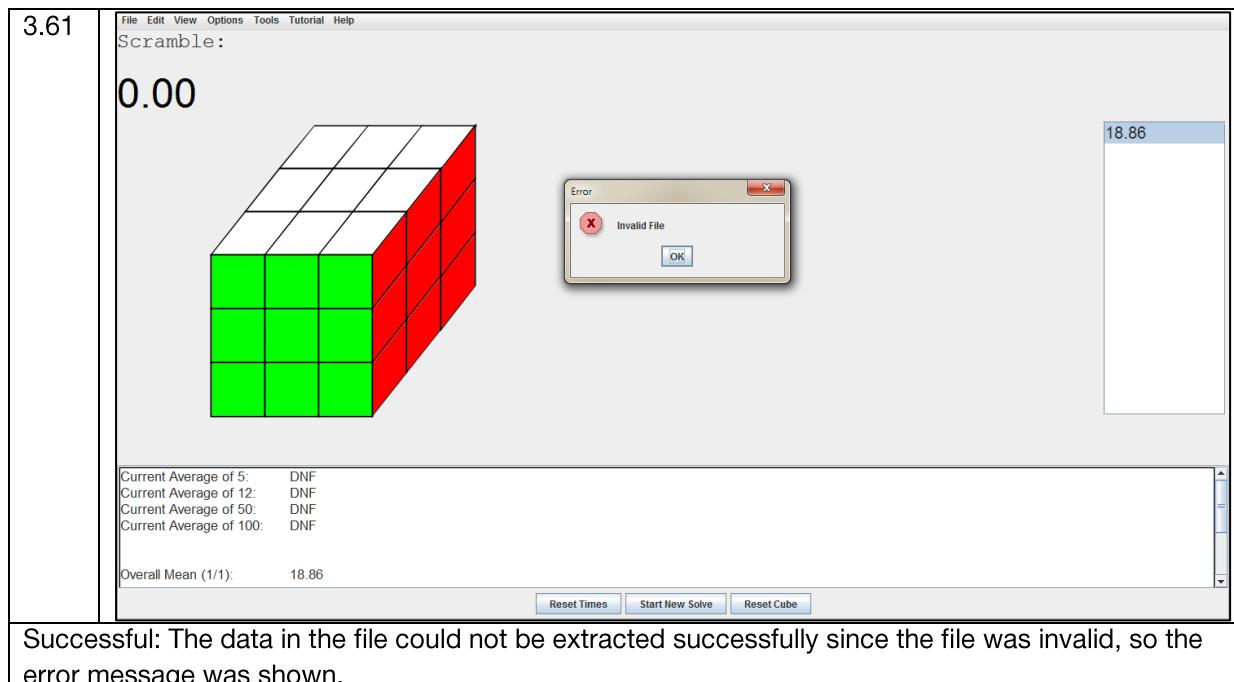
18.86

Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

Overall Mean (1/1): 18.86

Reset Times Start New Solve Reset Cube

Successful: The information in the file was extracted and added to the solve list as shown.



Successful: The data in the file could not be extracted successfully since the file was invalid, so the error message was shown.

3.62

File Edit View Options Tools Tutorial Help

Add Solve Ctrl-D
Edit Selected Solve Ctrl-E
Delete Selected Solve

Scramble: 0.00

12.93
14.78
11.92
4.41
10.81

Current Average of 5: 13.09 12.93, (14.78), 11.92, 14.41, (10.81)
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

Overall Mean (5/5): 12.97

Reset Times Start New Solve Reset Cube

File Edit View Options Tools Tutorial Help

Scramble: 0.00

12.93
11.92
14.41
10.81

Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

Overall Mean (4/4): 12.52

Reset Times Start New Solve Reset Cube

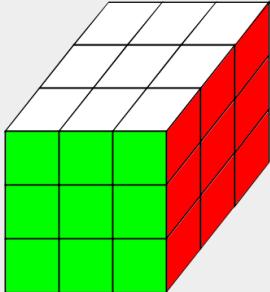
Successful: The selected item was removed from the list.

3.63

File Edit View Options Tools Tutorial Help

Scramble:

0.00



12.19
13.05
17.89
12.46
12.66
15.47

Current Average of 5: 13.73 13.05, (17.89), (12.46), 12.66, 15.47
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

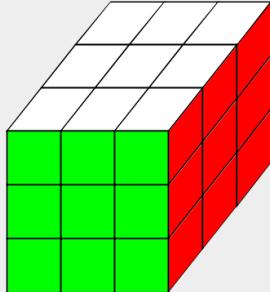
Overall Mean (6/6): 13.95

Reset Times Start New Solve Reset Cube

File Edit View Options Tools Tutorial Help

Scramble:

0.00



Times removed

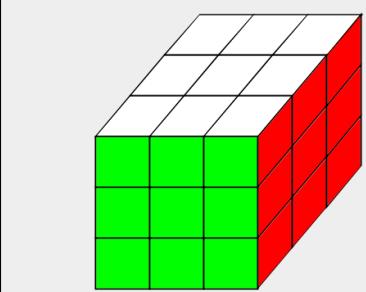
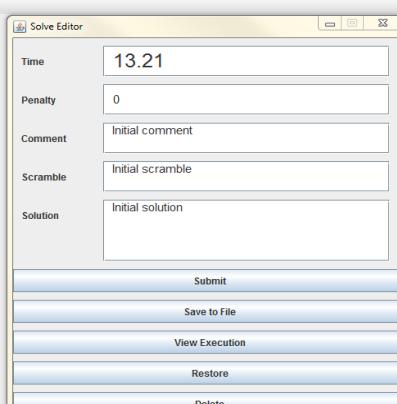
Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

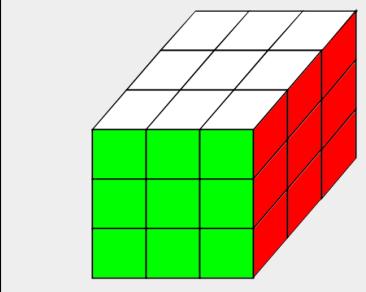
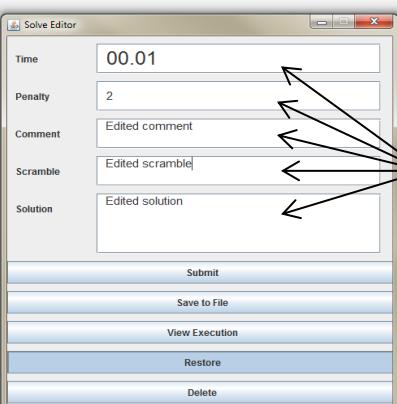
Overall Mean (0/0): DNF

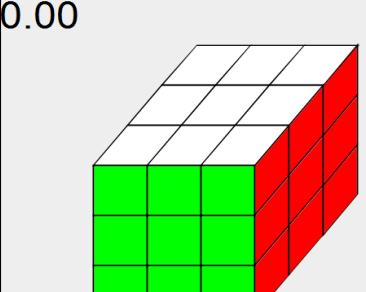
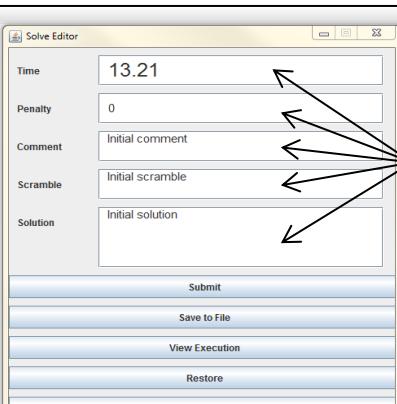
Reset Times Start New Solve Reset Cube

Successful: All solves were removed from the list at the right-hand side of the screen and the statistics were updated.

3.64

 Scramble: 0.00		 Time: 13.21 Penalty: 0 Comment: Initial comment Scramble: Initial scramble Solution: Initial solution Submit Save to File View Execution Restore Delete
Current Average of 5: DNF Current Average of 12: DNF Current Average of 50: DNF Current Average of 100: DNF		
Overall Mean (3/3): 13.44		
<input type="button" value="Reset Times"/> <input type="button" value="Start New Solve"/> <input type="button" value="Reset Cube"/>		

 Scramble: 0.00		 Time: 00.01 Penalty: 2 Comment: Edited comment Scramble: Edited scramble Solution: Edited solution Submit Save to File View Execution Restore Delete
Current Average of 5: DNF Current Average of 12: DNF Current Average of 50: DNF Current Average of 100: DNF		
Overall Mean (3/3): 13.44		
<input type="button" value="Reset Times"/> <input type="button" value="Start New Solve"/> <input type="button" value="Reset Cube"/>		

 Scramble: 0.00		 Time: 13.21 Penalty: 0 Comment: Initial comment Scramble: Initial scramble Solution: Initial solution Submit Save to File View Execution Restore Delete
Current Average of 5: DNF Current Average of 12: DNF Current Average of 50: DNF Current Average of 100: DNF		
Overall Mean (3/3): 13.44		
<input type="button" value="Reset Times"/> <input type="button" value="Start New Solve"/> <input type="button" value="Reset Cube"/>		

Successful: The original data in the form was restored after clicking the restore button, and any unsaved changes were discarded.

3.65

Scramble: L2 B2 D2 U2 R2 B2 L' R2 D B2 L2 B D2 U F2 R' B' R' L2 F2 R' L F D' L2

17.54

Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

Overall Mean (3/3): 15.63

Solve Editor

Time: 17.54
Penalty: 0
Comment:
Scramble: L2 B2 D2 U2 R2 B2 L' R2 D B2 L2 B D2 U F2 R'
Solution: R' B' R' L2 F2 R' L F D' L2
R U' R' U2 y R U' R' y U' R U2 R' y R U' R' y U'
R U' R' U2 R U' R' U' F R U' R' U' F R U2 R2 U'
R2 U' R2 U2 R U R2 U R U R' U' R' U' R' U'
U' L' R' D2 R U R' D2 R U' L' U'

Submit
Save to File
View Execution
Restore
Delete

Reset Times Start New Solve Reset Cube

15.41
17.54
13.95

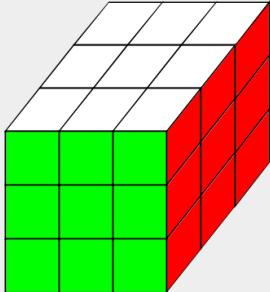
15.41
13.95

Successful: The selected solve was removed from the list.

3.66

Scramble:

0.00



Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

Overall Mean (0/0): DNF

Reset Times Start New Solve Reset Cube

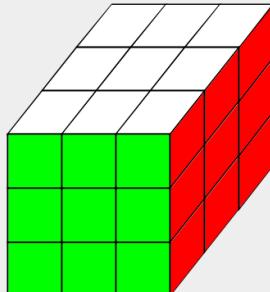
Scramble List

FRUR'U'F'
R2 U2 R2 U2 R2 U2

Add Scramble Edit Scramble Delete Scramble
Apply Scramble Save Selected to File Load Scrambles

Scramble:

0.00



Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

Overall Mean (0/0): DNF

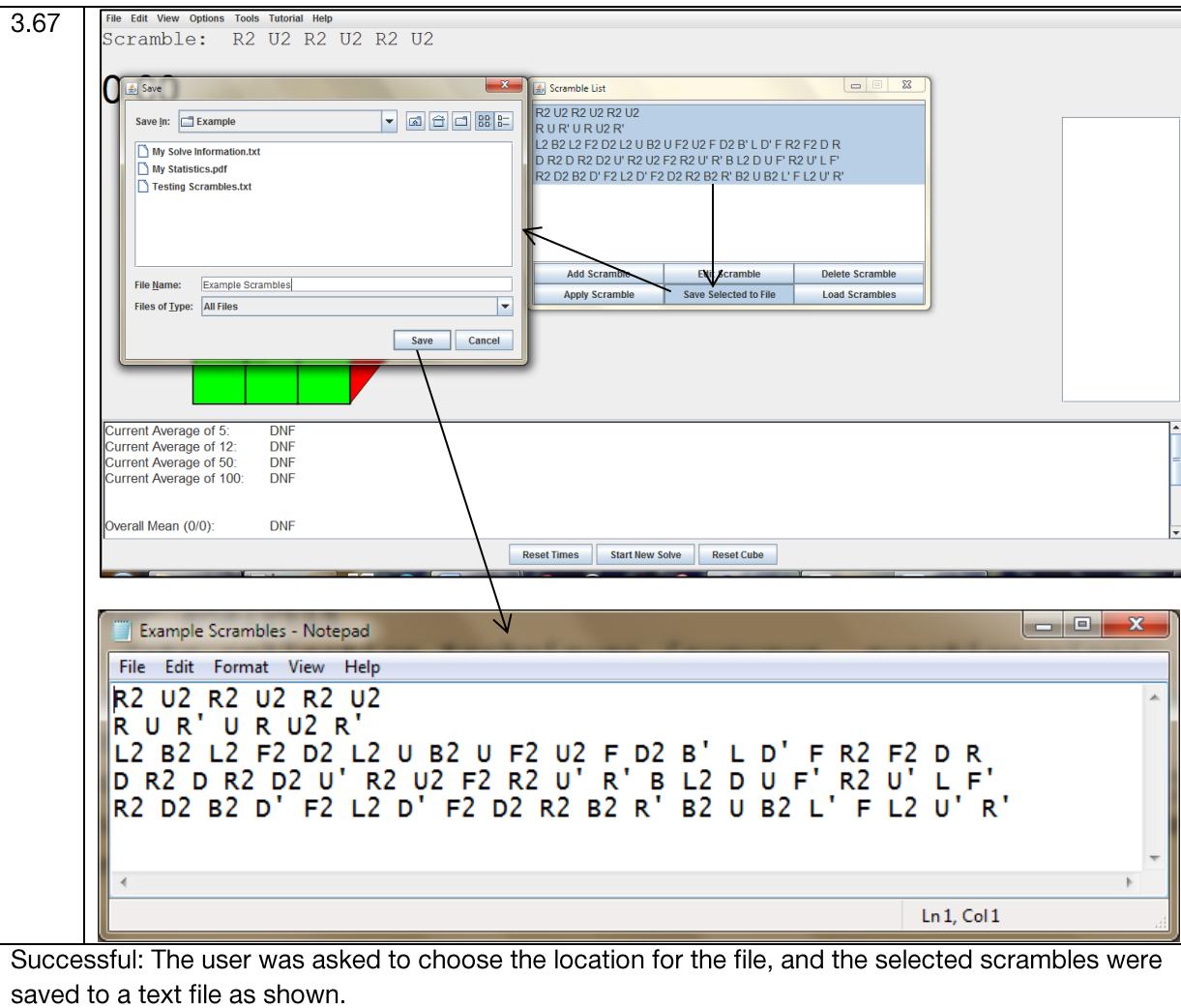
Reset Times Start New Solve Reset Cube

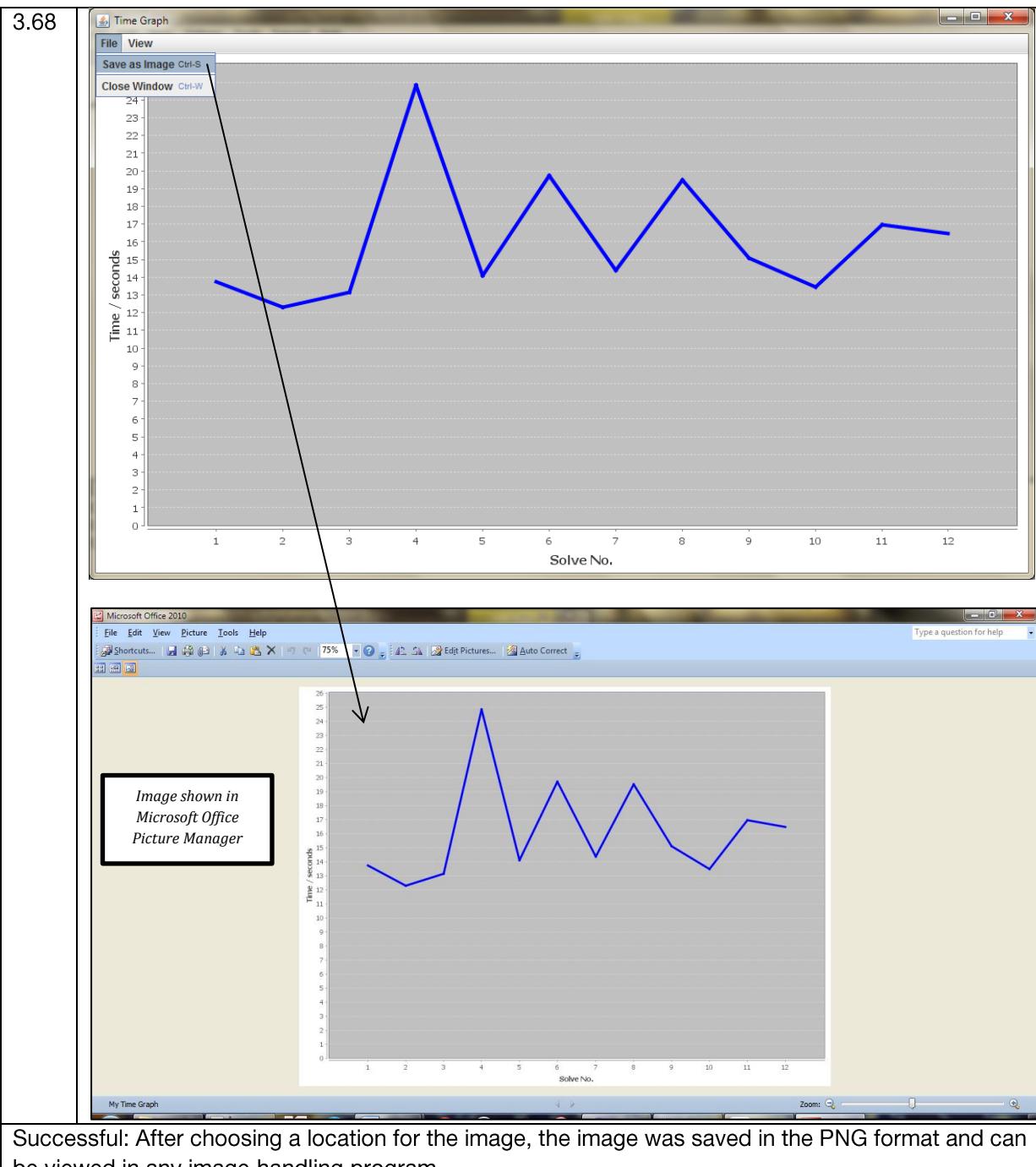
Scramble List

R2 U2 R2 U2 R2 U2

Add Scramble Edit Scramble Delete Scramble
Apply Scramble Save Selected to File Load Scrambles

Successful: The selected scramble was removed from the list.





3.69

Scramble:

0.00

Algorithm Table

ID	Algorithm	Comment
1	R U R' U'	Fast move (uneditable)
2	R' F R F'	Sledgehammer (uneditable)
3	R U R' U R U2 R'	Sune (uneditable)
4	F R' F' R	Hedgeslammer
5	R U' L' U R' U' L	Niklas
6	F R U R' U' F'	Bar orientation
7	U R U' R' U' F' U F	Edge insertion (right)

Add Algorithm Apply Reverse View Execution Delete Algorithm

Current Average of 5: DNF
 Current Average of 12: DNF
 Current Average of 50: DNF
 Current Average of 100: DNF

Overall Mean (0/0): DNF

Reset Times Start New Solve Reset Cube

Scramble:

0.00

Algorithm Table

ID	Algorithm	Comment
1	R U R' U'	Fast move (uneditable)
2	R' F R F'	Sledgehammer (uneditable)
3	R U R' U R U2 R'	Sune (uneditable)
4	F R' F' R	Hedgeslammer
5	R U' L' U R' U' L	Niklas
6	U R U' R' U' F' U F	Edge insertion (right)

Add Algorithm Apply Reverse View Execution Delete Algorithm

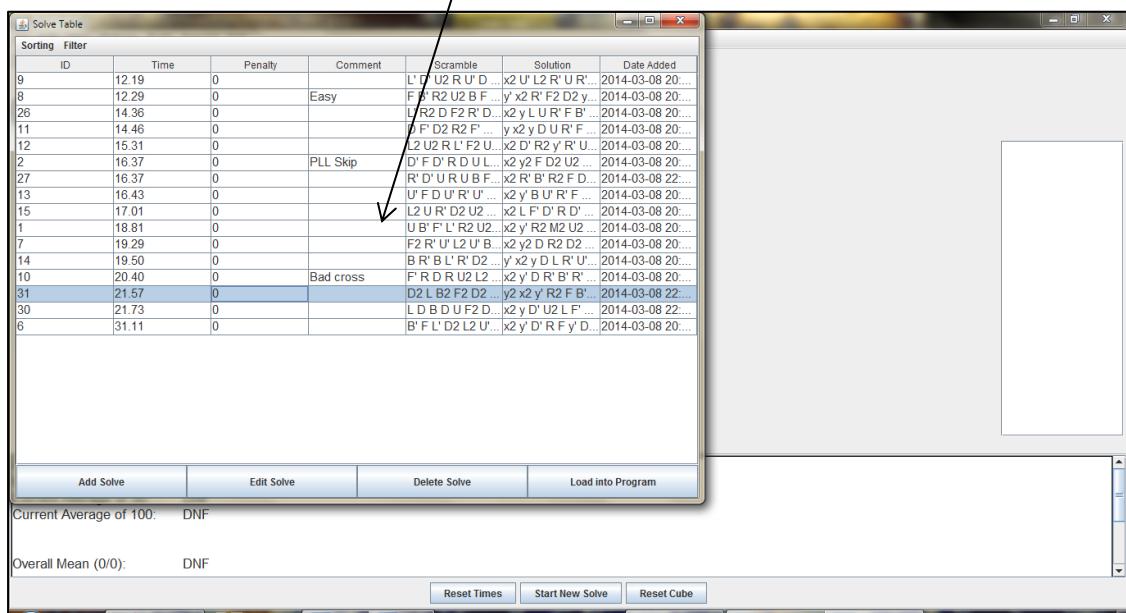
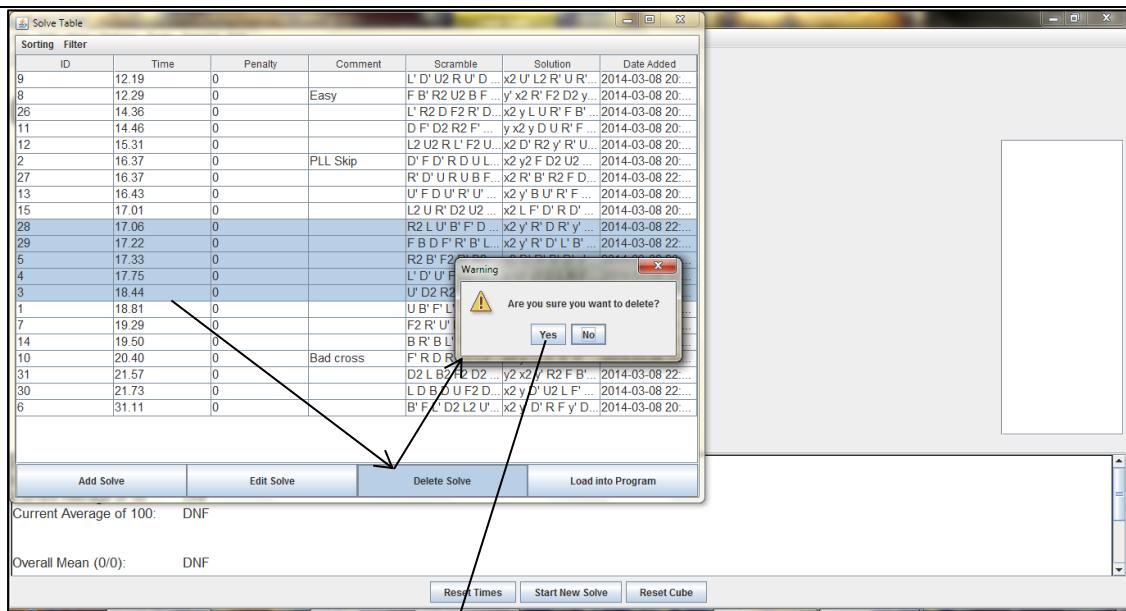
Current Average of 5: DNF
 Current Average of 12: DNF
 Current Average of 50: DNF
 Current Average of 100: DNF

Overall Mean (0/0): DNF

Reset Times Start New Solve Reset Cube

Successful: The selected algorithm was removed from the table.

3.70



Successful: A warning window was shown since five rows were selected, and after clicking Yes, the selected rows were removed.

3.71

ID	Time	Penalty	Comment	Scramble	Solution	Date Added
9	12.19	0		L' D' U2 R U' D ...	x2 U' L2 R' U' R ...	2014-03-08 20...
8	12.29	0	Easy	F' B' R2 U2 B F ...	y' x2 R' F2 D2 y ...	2014-03-08 20...
26	14.36	0		L' R2 D F2 R' D ...	x2 y L U' R' F B' ...	2014-03-08 20...
11	14.46	0		D F' D2 R2 F' ...	y x2 y D U' R' F ...	2014-03-08 20...
12	15.31	0		L2 U2 R L' F2 U ...	x2 D' R2 y' R' U ...	2014-03-08 20...
2	16.37	0	PLL Skip	D' F' D' R D U L ...	x2 y2 F D2 U2 ...	2014-03-08 20...
27	16.37	0		R' D' U' R U B F ...	x2 R' B' R2 F D ...	2014-03-08 22...
13	16.43	0		U' F D' U' R' U' ...	x2 y B' U' R' F ...	2014-03-08 20...
15	17.01	0		L2 U' R' D2 U2 ...	x2 L' F' D' R D' ...	2014-03-08 20...
1	18.81	0		U B' F' L' R2 U2 ...	x2 y' R2 M2 U2 ...	2014-03-08 20...
7	19.29	0		F2 R' U' L2 U' B ...	x2 y2 D R' D2 ...	2014-03-08 20...
14	19.50	0		B' R' B' U' R' D2 ...	y x2 y D L' R' U ...	2014-03-08 20...
10	20.40	0	Bad cross	F' R' D' R U2 L2 ...	x2 y' D R' B' R ...	2014-03-08 20...
31	21.57	0		D2 L' B2 F2 D2 ...	y2 x2 y R2 F B' ...	2014-03-08 22...
30	21.73	0		L D B D U F2 D ...	x2 y' D' U2 L F' ...	2014-03-08 22...
6	31.11	0		B' F' L' D2 L2 U ...	x2 y' D' R F y' D ...	2014-03-08 20...

Add Solve Edit Solve Delete Solve Load into Program

Current Average of 100: DNF

Overall Mean (0/0): DNF

Reset Times Start New Solve Reset Cube

12.19
15.31
19.50
20.40

All data, i.e. time, scramble, solution etc.

Successful: The selected solves were loaded into the main window's list of solves.

3.72

The screenshot shows a Windows application window titled "Member Table". The table contains 13 rows of member data with columns: ID, Forenames, Surname, Gender, Date of Birth, Email, and Form Class. A warning dialog box is overlaid on the application, asking "Are you sure you want to delete?" with "Yes" and "No" buttons. Arrows point from the "Delete Member" button in the application's footer to both the dialog box and the table row being deleted.

ID	Forenames	Surname	Gender	Date of Birth	Email	Form Class
1	Ryan Charles	Jones	Male	24/01/2002	rjones@gmail.com	8W
2	Thomas	Smith	Male	13/12/1998	tsmith@hotmail.com	11M
3	Jack	Cooper	Male	22/05/2001	jcooper@hotmail.com	9S
4	Lee	Brown	Male	18/01/1998	lbrown@gmail.com	12R
5	Joy	Montgomery	Female	22/10/2000	jmontgomery@gmail.com	9S
7	Lily	Green	Female	14/02/1996	lgreen@yahoo.com	14T
8	William	Johnston	Male	12/03/2000	wjohnston@gmail.com	10S
9	Simon	Lane	Male	05/09/1995	slane@gmail.com	14R
11	Hannah	Laverty	Female	21/04/1996	hlaverty@hotmail.com	14M
12	Sarah	Rutherford	Female	28/11/1996	srutherford@gmail.com	13M
13	Sam	Middleton	Male	10/09/1999	smiddleton@gmail.com	10W

ID	Forenames	Surname	Gender	Date of Birth	Email	Form Class
1	Ryan Charles	Jones	Male	24/01/2002	rjones@gmail.com	8W
2	Thomas	Smith	Male	13/12/1998	tsmith@hotmail.com	11M
3	Jack	Cooper	Male	22/05/2001	jcooper@hotmail.com	9S
4	Lee	Brown	Male	18/01/1998	lbrown@gmail.com	12R
5	Joy	Montgomery	Female	22/10/2000	jmontgomery@gmail.com	9S
7	Lily	Green	Female	14/02/1996	lgreen@yahoo.com	14T
9	Simon	Lane	Male	05/09/1995	slane@gmail.com	14R
11	Hannah	Laverty	Female	21/04/1996	hlaverty@hotmail.com	14M
12	Sarah	Rutherford	Female	28/11/1996	srutherford@gmail.com	13M
13	Sam	Middleton	Male	10/09/1999	smiddleton@gmail.com	10W

Successful: A warning window was shown, confirming the user's decision to delete the selected row. After clicking Yes, the selected row was removed from the table.

3.73

The screenshot shows a Windows application window titled "Competition Table". Inside the window is a table with two columns: "ID" and "Date". The data is as follows:

ID	Date
1	02/10/2013
2	16/10/2013
3	13/11/2013
4	27/11/2013
5	11/12/2013
6	8/1/2014
7	22/01/2014
9	30/01/2014

At the bottom of the window, there is a toolbar with four buttons: "Add Competition", "Edit Competition Date", "View Rankings", and "Delete Competition". The "Delete Competition" button is highlighted with a blue glow. A mouse cursor is hovering over this button.

A modal dialog box titled "Warning" is displayed in front of the toolbar. It contains a yellow exclamation mark icon and the text "Are you sure you want to delete?". There are two buttons at the bottom of the dialog: "Yes" and "No".

Arrows indicate the flow of the process: one arrow points from the "Delete Competition" button to the "Yes" button in the dialog, and another arrow points from the "Yes" button back to the table, indicating that the selected row will be deleted.

Successful: A warning window was shown, confirming the user's decision, then the selected row was removed from the table.

3.74

Name	Member ID	Rank	Average	Time 1	Time 2	Time 3	Time 4	Time 5
Lily Green	7	1	13.18	13.25	13.64	13.02	13.28	12.56
Hannah Laverty	11	2	16.42	16.52	16.78	16.42	16.31	16.00
Thomas Smith	2	3	16.61	16.42	16.51	16.89	20.56	16.10
Sarah Rutherford	12	4	19.59	19.81	19.42	18.63	19.55	26.31
Ryan Charles Jones	1	5	20.36	20.27	21.30	21.22	19.58	18.49
Joy Montgomery	5	6	25.48	25.14	26.28	25.64	25.66	25.13
Lee Brown	4	7	38.17	35.40	32.16	38.90	40.20	41.70
Simon Lane	9	8	40.66	40.78	45.25	36.29	38.51	42.70

Competition ID = 1 Add Edit Delete

The selected row has been removed from the table, and the rankings have been updated.

Successful: A warning window was shown, confirming the user's decision, then after clicking Yes, the selected row was removed from the table.

3.75

Preferences

Real-time solving speed (ms)	1
Inspection time (seconds)	15
Show Click-to-Solve warning	<input checked="" type="radio"/> Yes <input type="radio"/> No
Scramble text size	1

Save and Close Cancel Restore Defaults

Preferences

Real-time solving speed (ms)	250
Inspection time (seconds)	15
Show Click-to-Solve warning	<input checked="" type="radio"/> Yes <input type="radio"/> No
Scramble text size	27

Save and Close Cancel Restore Defaults

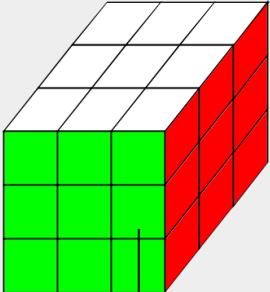
Successful: The default preferences for the system were saved and displayed in the text fields.

3.76

File Edit View Options Tools Tutorial Help

Scramble:

0.00



Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

Overall Mean (0/0): DNF

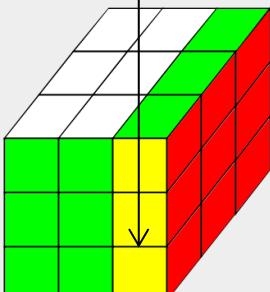
Press 'i'

Reset Times Start New Solve Reset Cube

File Edit View Options Tools Tutorial Help

Scramble:

0.00



Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

Overall Mean (0/0): DNF

Reset Times Start New Solve Reset Cube

Successful: The display was updated, showing that the move 'R' has been performed.

3.77

File Edit View Options Tools Tutorial Help

Scramble: B F R2 F2 L2 F U2 F' U2 L2 D2 R' D B' F' U R B2 L2 F2 R'

14

First scramble in scramble list is B F R2 F2 L2 F U2 F' U2 L2 D2 R' D B' F' U R B2 L2 F2 R'

14

File Edit View Options Tools Tutorial Help

Scramble: L2 U2 L2 B2 U L2 F2 U R2 F2 D' B D F2 R' U R2 B R' F R'

Second scramble in scramble list is L2 U2 L2 B2 U L2 F2 U R2 F2 D' B D F2 R' U R2 B R' F R'

14

File Edit View Options Tools Tutorial Help

Scramble: B F R2 F2 L2 F U2 F' U2 L2 D2 R' D B' F' U R B2 L2 F2 R'

All scrambles have been used, so the first scramble is reused.

13.23
12.94

Successful: The two scrambles in the scramble list were used to scramble the cube, then the first scramble was used again. If this were continued, the second scramble would be used again, then the first, then the second etc.

3.78

Scramble: F2 B' R2 L' D2 B D U' F2 B2 D' L2 U F2 D U B' F L2 D2 R2 L2 D2 F2 D

0.79 ←

The solve has been started and the timer is running

Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

Overall Mean (0/0): DNF

Reset Times Start New Solve Reset Cube

File Edit View Options Tools Tutorial Help

Scramble: F B D U' F2 B2 D' L2 U F2 D U B' F L2 D2 R2 L2 D2 F2 D

15.26

Cancel Solve Ctrl-Q
Clear Stickers
 Paint Custom State
 Solve Cube
 Solve Piece
Apply Random Scramble

Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

Overall Mean (0/0): DNF

Reset Times Start New Solve Reset Cube

File Edit View Options Tools Tutorial Help

Scramble: F2 B' R2 L' D2 B D U' F2 B2 D' L2 U F2 D U B' F L2 D2 R2 L2 D2 F2 D

0.00 ←

The timer has stopped and reset to 0.00

Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

Overall Mean (0/0): DNF

Reset Times Start New Solve Reset Cube

Successful: The timer stopped and nothing else happened, i.e. the time was not added to the list.

3.79

Scramble: 0.00

File Edit View Options Tools Tutorial Help

Cancel Solve Ctrl-Q
Clear Stickers
 Paint Custom State
Solve Cube Ctrl-R
 Solve Piece
Apply Random Scramble

Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

Overall Mean (0/0): DNF

Reset Times Start New Solve Reset Cube

Scramble: L2 U D L2 R B L F2 B R D' R L' D2 U' F' U' F' U2 B2 U' D2 F2 U' D2

0.00

File Edit View Options Tools Tutorial Help

Reset Times Start New Solve Reset Cube

Successful: A randomly generated scramble was applied to the cube, and this scramble was displayed at the top of the window.

3.80

Scramble:

0.00

No piece can have identical stickers, i.e. the green-green-red piece does not exist

Warning
This is not a valid state. Would you like to reset the cube?
Yes No

There cannot be two white-green edges

Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

Overall Mean (0/0): DNF

Reset Times Start New Solve Reset Cube

Scramble:

0.00

The two erroneous pieces have been greyed out

Color Selection COLOR

Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

Overall Mean (0/0): DNF

Reset Times Start New Solve Reset Cube

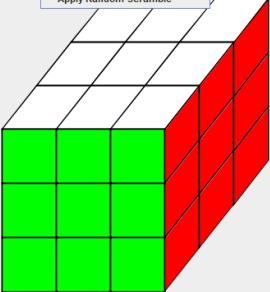
Successful: The erroneous pieces were identified and removed from the cube before continuing.

3.81

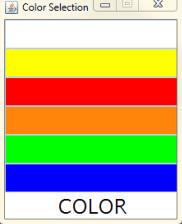
Scramble: 0.00

File Edit View Options Tools Tutorial Help

Cancel Solve Ctrl-Q
Clear Stickers
 Paint Custom State
Solve Cube Ctrl-R
 Solve Piece
Apply Random Scramble



Color Selection



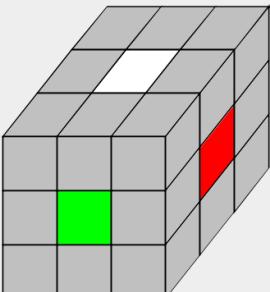
Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

Overall Mean (0/0): DNF

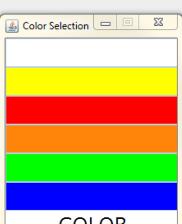
Reset Times Start New Solve Reset Cube

Scramble: 0.00

File Edit View Options Tools Tutorial Help



Color Selection

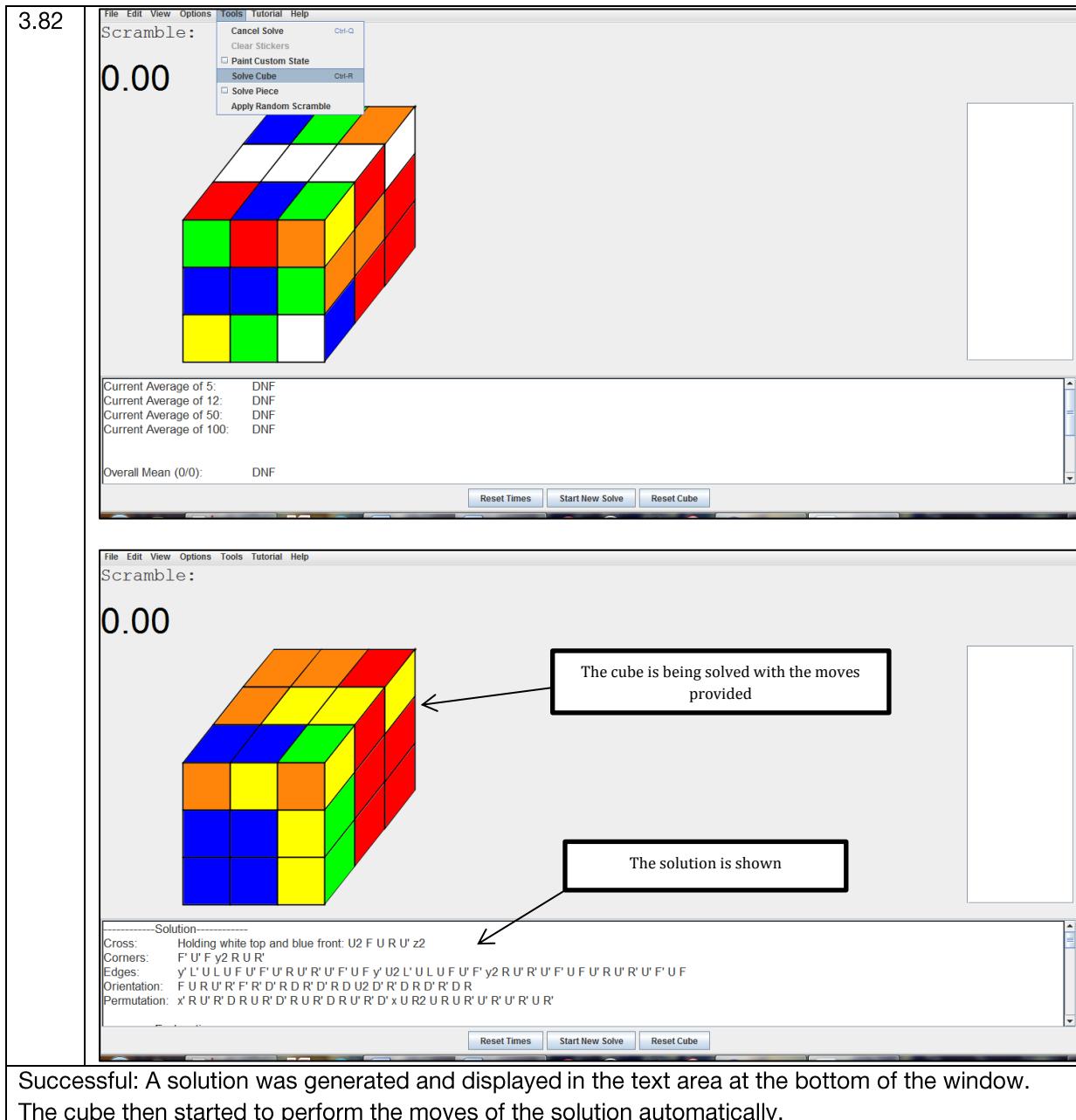


Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

Overall Mean (0/0): DNF

Reset Times Start New Solve Reset Cube

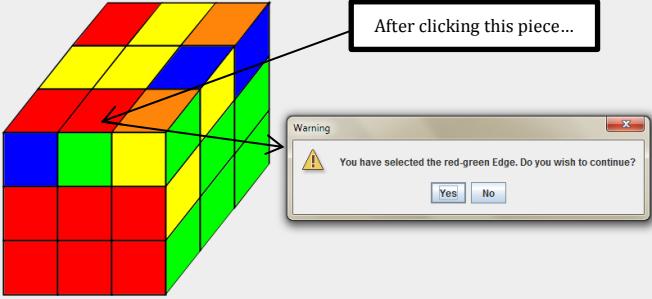
Successful: All stickers on the cube changed from their original colour to grey.



3.83

Scramble:

0.00



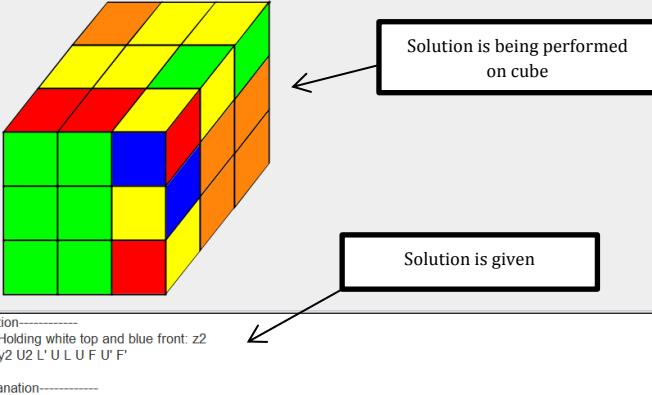
Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

Overall Mean (0/0): DNF

Reset Times Start New Solve Reset Cube

Scramble:

0.00



Solution-----
Cross: Holding white top and blue front: z2
Edges: y2 U2 L' U L U F U' F'
Explanation-----
Edges:
The edge needs to go to the left, so set up the edge then perform L' U L U F U' F'

Reset Times Start New Solve Reset Cube

Successful: A warning window appeared, confirming the decision to solve the red-green edge. After clicking Yes, a solution was generated and the cube performed the solution automatically.

3.84

Scramble: D2 R2 B2 R2 B' D2 R' U2 D' R2 D2 R F2 U F2 D2 B L2 R' U' D' R' U2 R' U2

13

Cube is scrambled randomly

Inspection timer starts

Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

Overall Mean (0/0): DNF

After clicking this...

Reset Times Start New Solve Reset Cube

Successful: A scramble was generated randomly, applied to the cube, then displayed at the top of the screen, and the inspection timer started counting down from the value specified in the preferences.

3.85

Scramble: B2 D' L U2 D' B' D' L' F' U B L2 R U2 L2 D' U B' R F' R2 U B L2 D

25.17

Timer is running since a solve is in progress, but after clicking this...

Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

Overall Mean (0/0): DNF

Reset Times Start New Solve Reset Cube

0.00 ←

Timer stops and resets to 0.00

Cube resets to its default state

Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

Overall Mean (0/0): DNF

Reset Times Start New Solve Reset Cube

Successful: The cube resets to the solved state with white on top and green on front. The timer also stops and reset to 0.00

3.86

File Edit View Options Tools Tutorial Help
Tutorial
0.00

The optimal solution used 3 moves, and then the user performs 3 moves...

Congratulations
Well done!
Would you like to play again?
Yes No

(3/11):
The next situation you need to recognise is when the corner is in the top layer and the white stickers is facing to the front.
Look at the White-Red-Green corner.
Its 'destination' is between the White, Red, and Green centres, so we must bring the corner 'above' its destination. In this case, the corner is already above its destination. The white sticker is facing to the front, so now we can learn an algorithm to solve this piece:

Description Hint Reset Solution Back Next

Successful: A congratulations message was shown, informing the user that they had solved the specified problem.

3.87

File Edit View Options Tools Tutorial Help
Tutorial
0.00

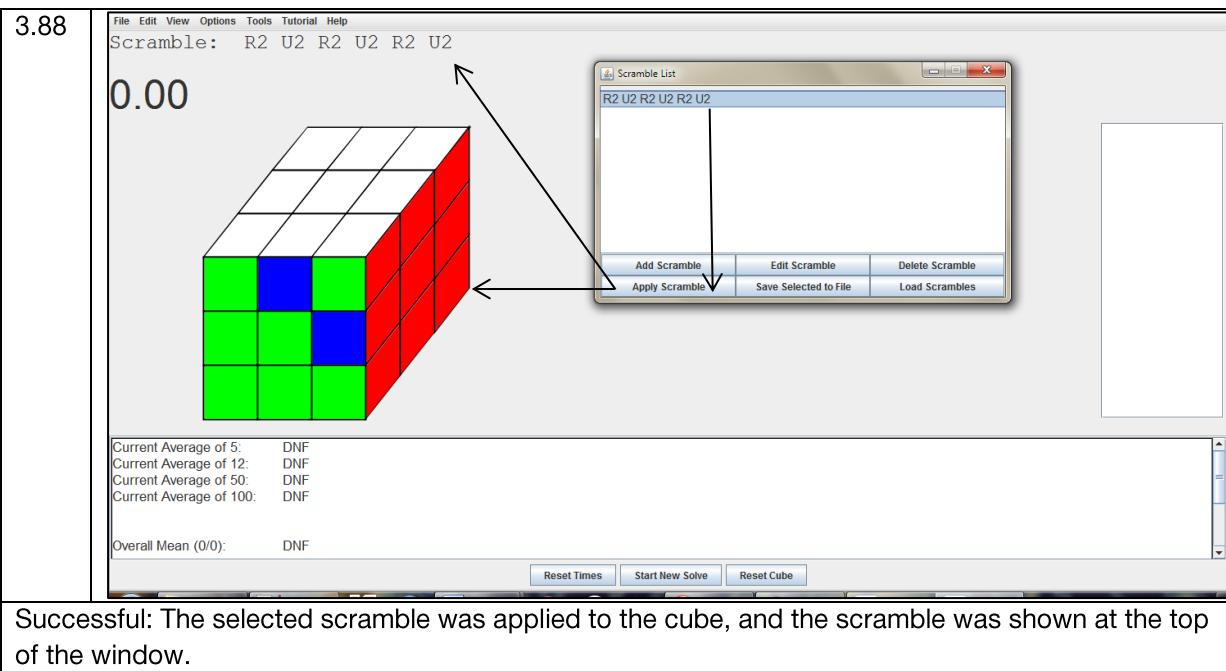
The optimal solution used 3 moves, and then the user performs 10 moves...

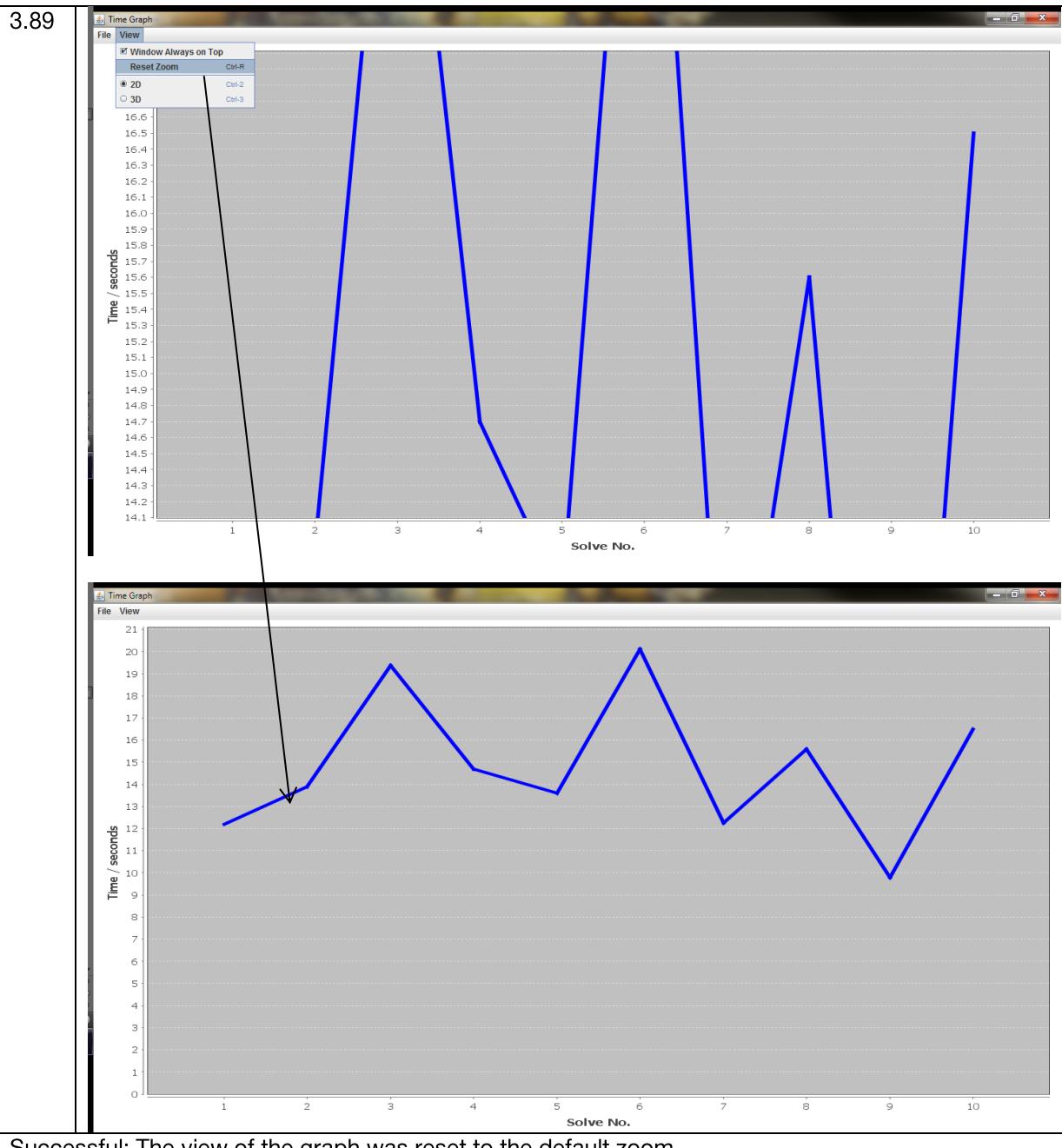
Congratulations
You solved the problem, but you could have done it in fewer moves.
Would you like to try again?
Yes No

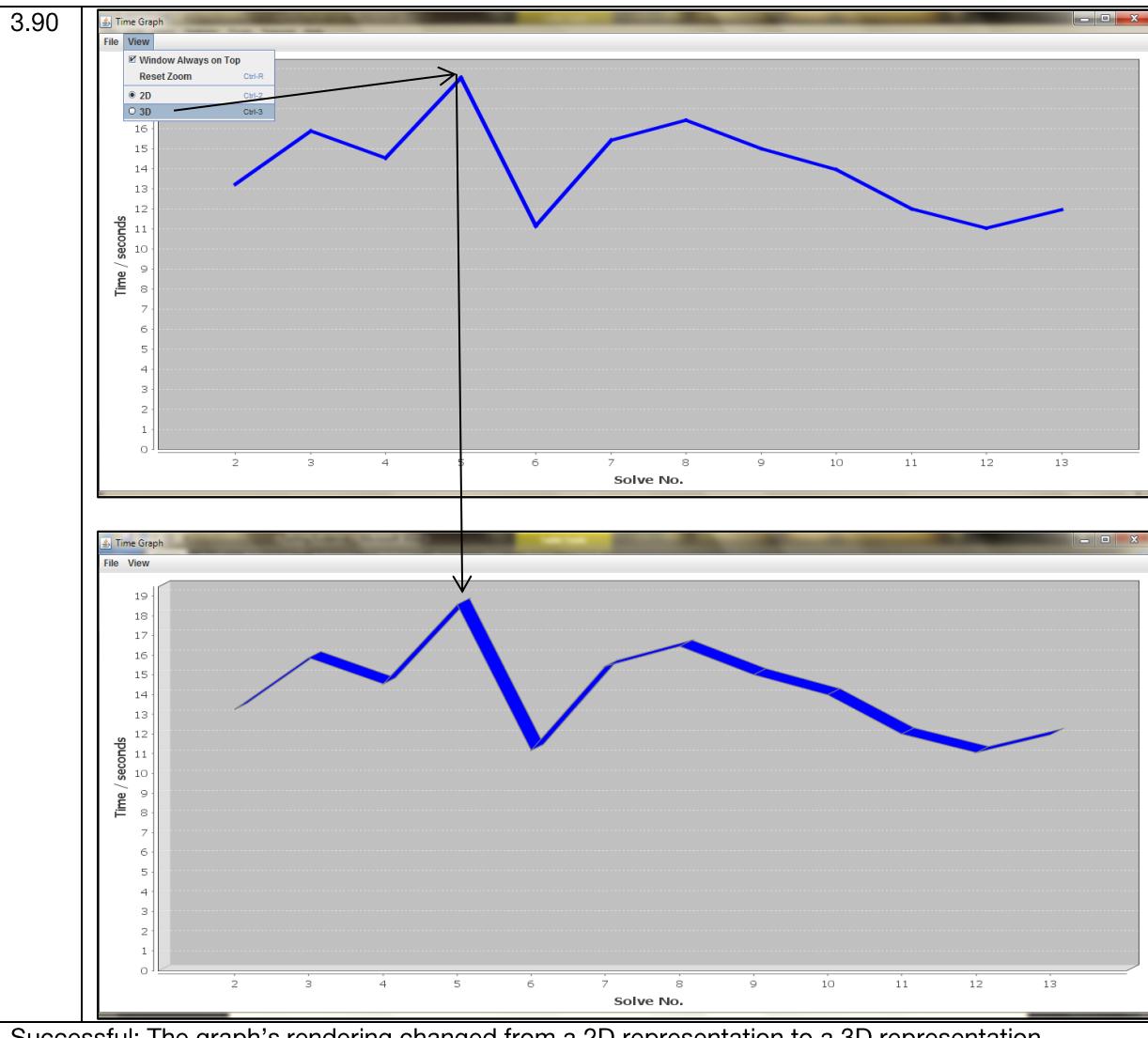
(3/11):
The next situation you need to recognise is when the corner is in the top layer and the white stickers is facing to the front.
Look at the White-Red-Green corner.
Its 'destination' is between the White, Red, and Green centres, so we must bring the corner 'above' its destination. In this case, the corner is already above its destination. The white sticker is facing to the front, so now we can learn an algorithm to solve this piece:

Description Hint Reset Solution Back Next

Successful: A congratulations message was shown, informing the user that they had solved the specified problem, but since the number of moves used was not optimal, the message included the text as shown.





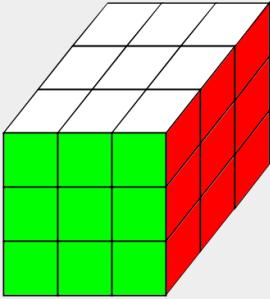


3.91

File Edit View Options Tools Tutorial Help

Scramble:

0.00



Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

Overall Mean (0/0): DNF

Reset Times Start New Solve Reset Cube

Algorithm Table

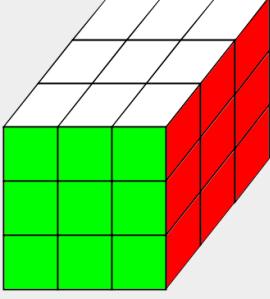
ID	Algorithm	Comment
1	R U R' U'	Fast move (uneditable)
2	R' F R F'	Sledgehammer (uneditable)
3	R U R' U R U2 R'	Sune (uneditable)
4	F R' F R	Hedgeslammer
5	R U' L' U R' U' L	Niklas

Add Algorithm Apply Reverse View Execution Delete Algorithm

File Edit View Options Tools Tutorial Help

Scramble:

0.00



Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

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Reset Times Start New Solve Reset Cube

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4	F R' F R	Hedgeslammer
5	R U' L' U R' U' L	Niklas
6		

Add Algorithm Apply Reverse View Execution Delete Algorithm

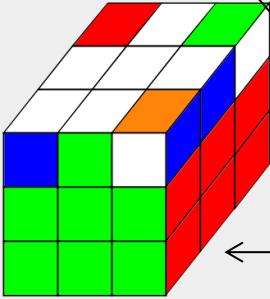
Successful: A row was added to the table and the ID was added automatically.

3.92

File Edit View Options Tools Tutorial Help

Scramble: R U2 R' U' R U' R'

0.00



Algorithm Table

ID	Algorithm	Comment
1	R U R' U'	Fast move (uneditable)
2	R' F R F'	Sledgehammer (uneditable)
3	R U R' U R U2 R'	Sune (uneditable)
4	F R' F' R	Hedgeslammer
5	R U' U' R' U' L	Niklas

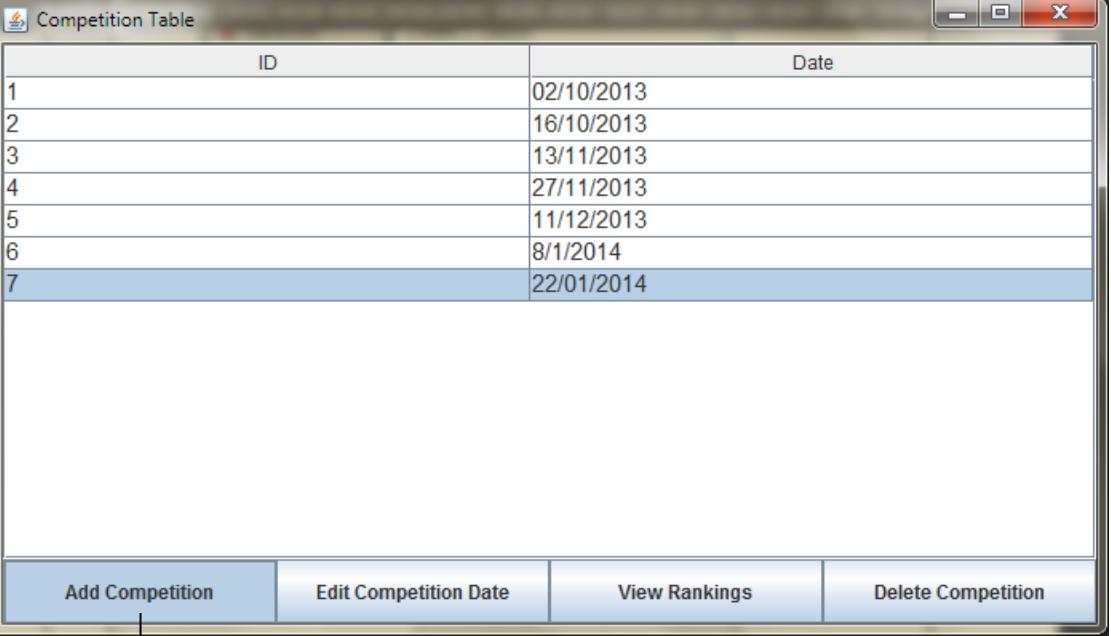
Add Algorithm Apply Reverse View Execution Delete Algorithm

Current Average of 5: DNF
Current Average of 12: DNF
Current Average of 50: DNF
Current Average of 100: DNF

Overall Mean (0/0): DNF

Reset Times Start New Solve Reset Cube

Successful: The reverse of the selected algorithm ($R U R' U R U2 R' \rightarrow R U2 R' U' R U' R'$) was applied to the cube, and the reverse of the selected algorithm was shown as the scramble at the top of the window.

3.93		 Competition Table	
		ID	Date
1		02/10/2013	
2		16/10/2013	
3		13/11/2013	
4		27/11/2013	
5		11/12/2013	
6		8/1/2014	
7		22/01/2014	

		Add Competition	Edit Competition Date	View Rankings	Delete Competition
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		Add Competition	Edit Competition Date	View Rankings	Delete Competition
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Successful: A row was added to the table and the ID was generated automatically.