Automatic Shift Scheduling Software
Schedule Nurse III Tutorial

Dec.04.2020 Sugawara Systems

Structure of the document

■ Video Tutorial

Dr. Planning is an example of using the software, solving a problem from scratch.

■ Tutorial

The main part of the document. It outlines the usage method of the program using real-world examples. As you go through the tutorial, try the same things in the program yourself.

■ User manual

This part explains the usage method for each item. Please refer to the necessary sections.

■ Advanced user manual

Under Construction.

■ Python3_Constraint Programming Tutorial/Manual

This is a programming manual for more advanced users.

Key Points

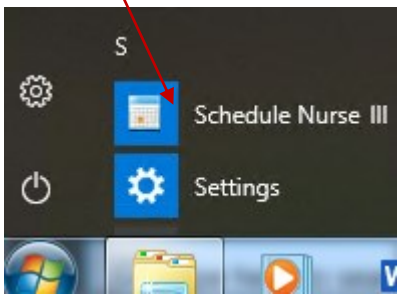
The critical thing to remember is that constraints create the shift work schedule. We have three main points:

- We, human beings, make Constraints.
- The machine (scheduling solver) calculates the solution that satisfies them.
- You can achieve your ideal assignments by adjusting the weight of constraints.

Let's start with a simple example and gradually move on to more complex models with the tutorial.
In this tutorial, we will use a two-shift work schedule as an example to explain the main points described above.

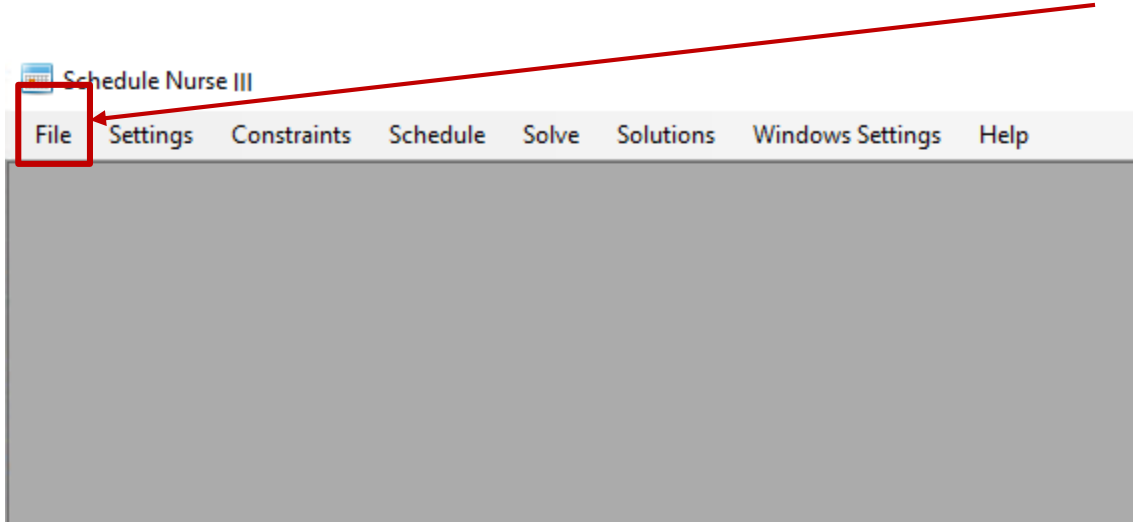
Launching the program

Click the icon on start menu.



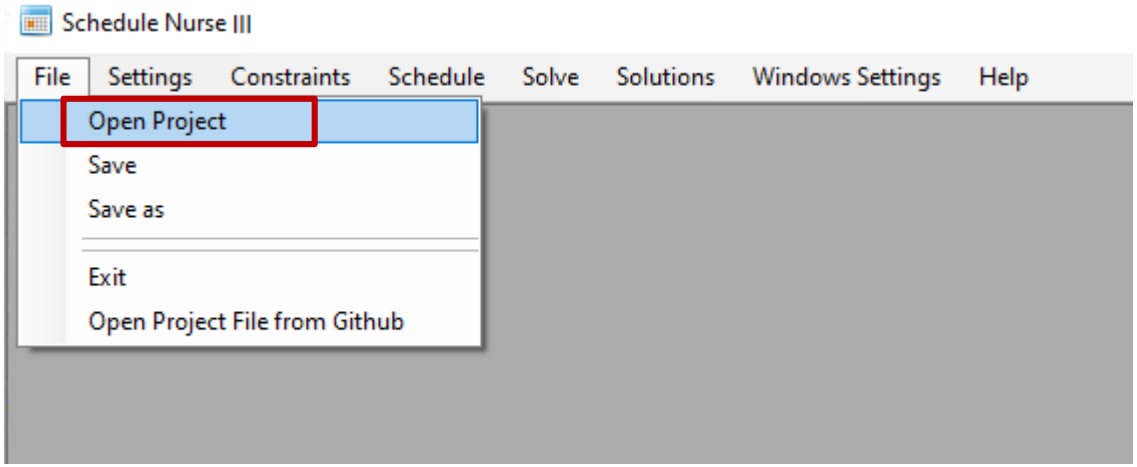
The screen after launching the program

This is the screen just after launching the program. Click “File.”



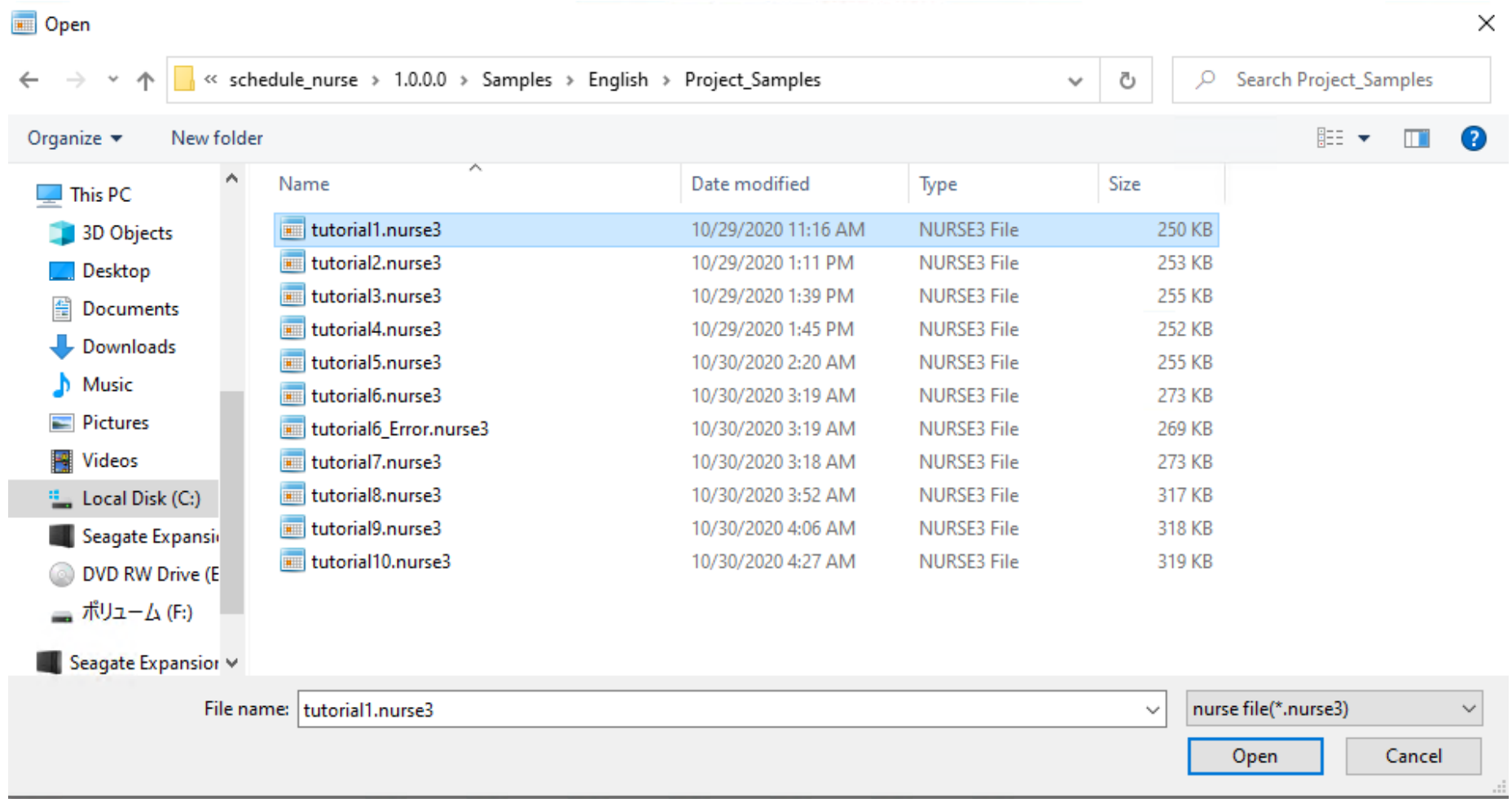
Open Project

Click ”Open project”



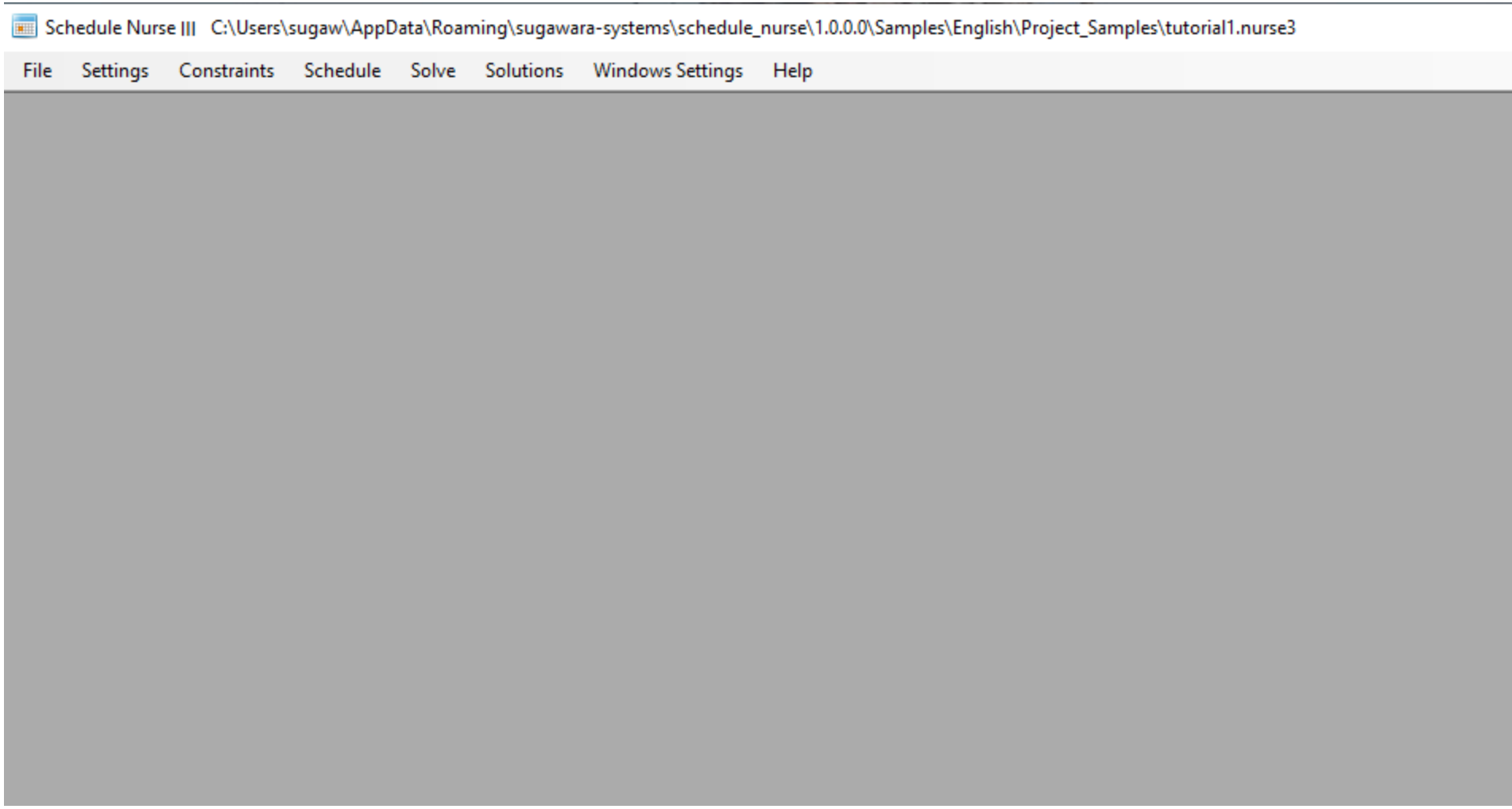
Loading a project file

Open the folder where you installed the software and the folder "Project Samples" in it. In this folder, you will find the sample project files 1 through 10 meant for practice. Double-click on Tutorial 1.



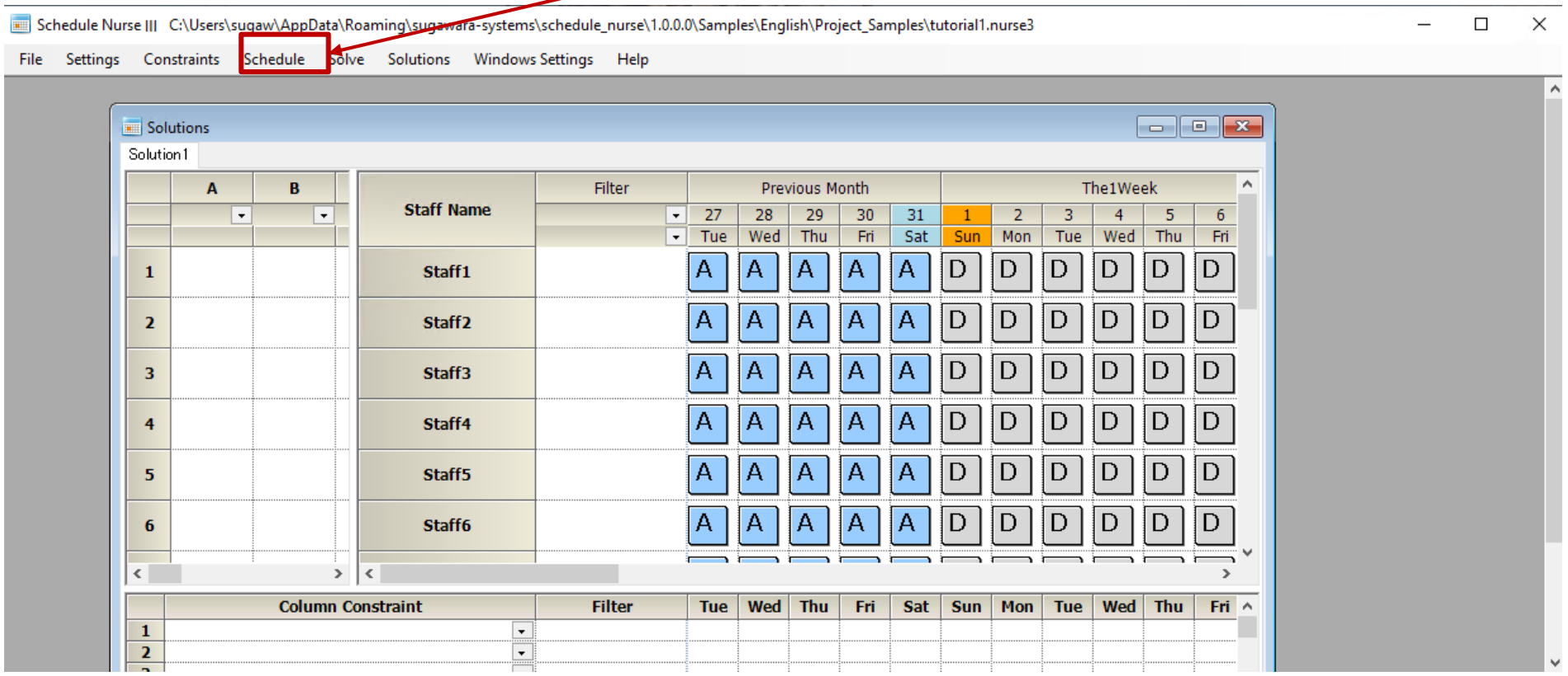
The screen after loading a project

This is the screen just after loading a project.



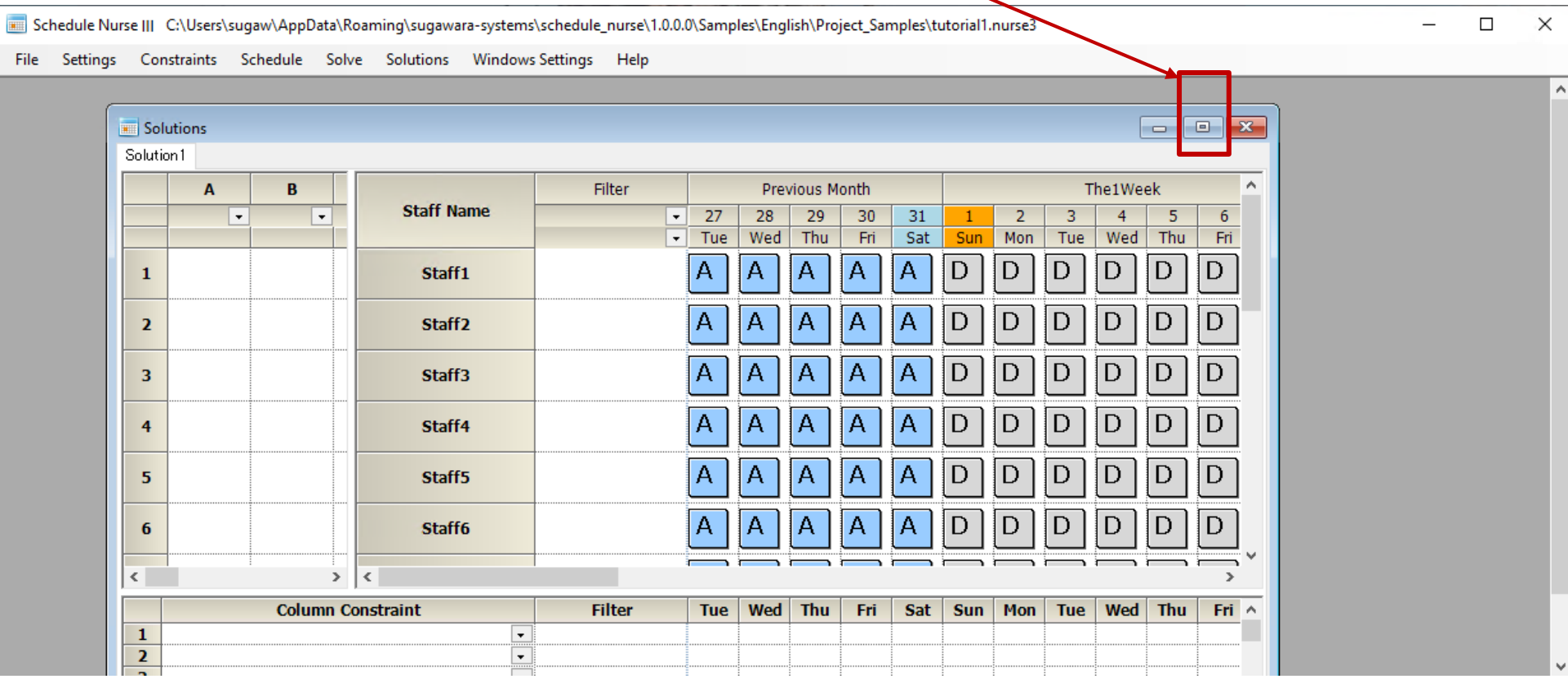
Loading the “Solution” screen

The loaded project file contains a solution. Click on "Solution" and you will see the following screen.



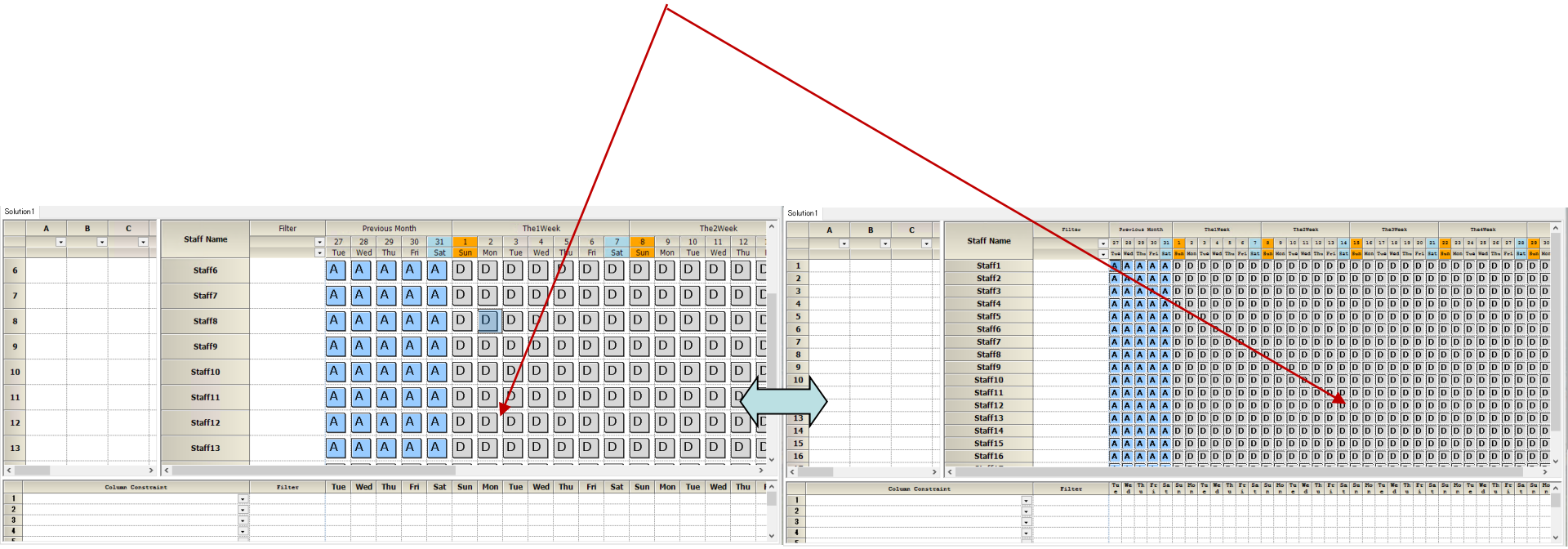
Maximizing the “Solution” screen

You can maximize the screen by clicking here.



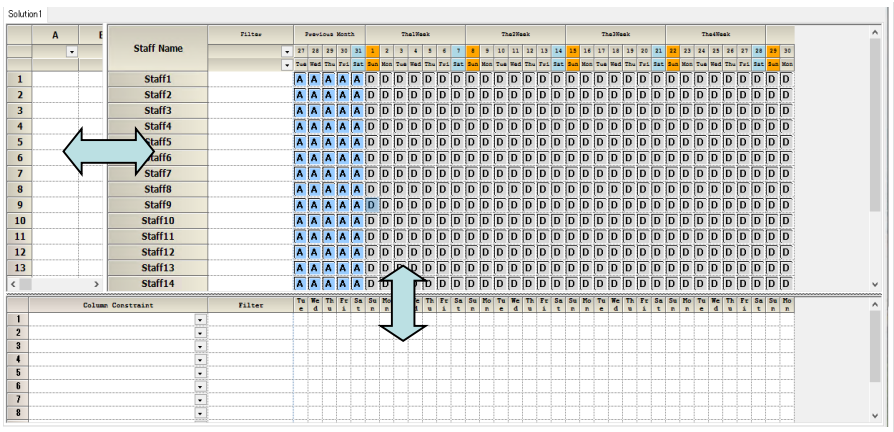
How to operate the “Solution” screen

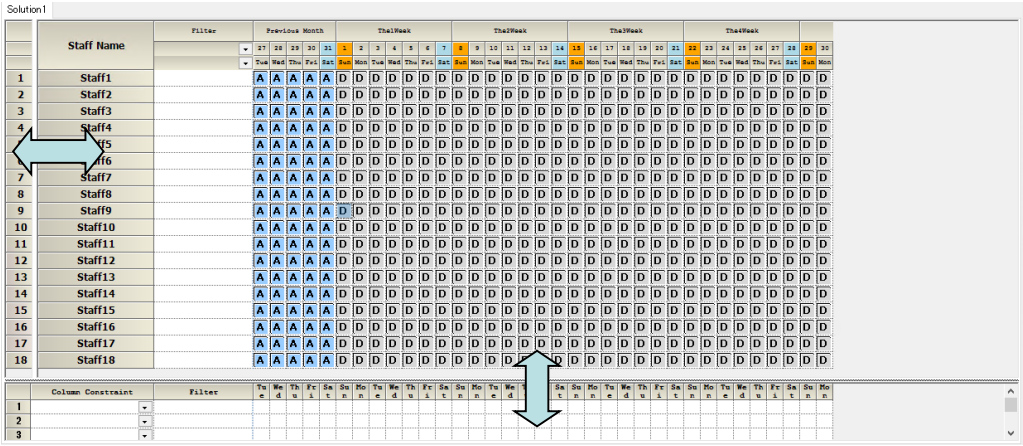
You can toggle between zooming in and out by double-clicking on any point on the "Solution" screen.



Changing the screen layout

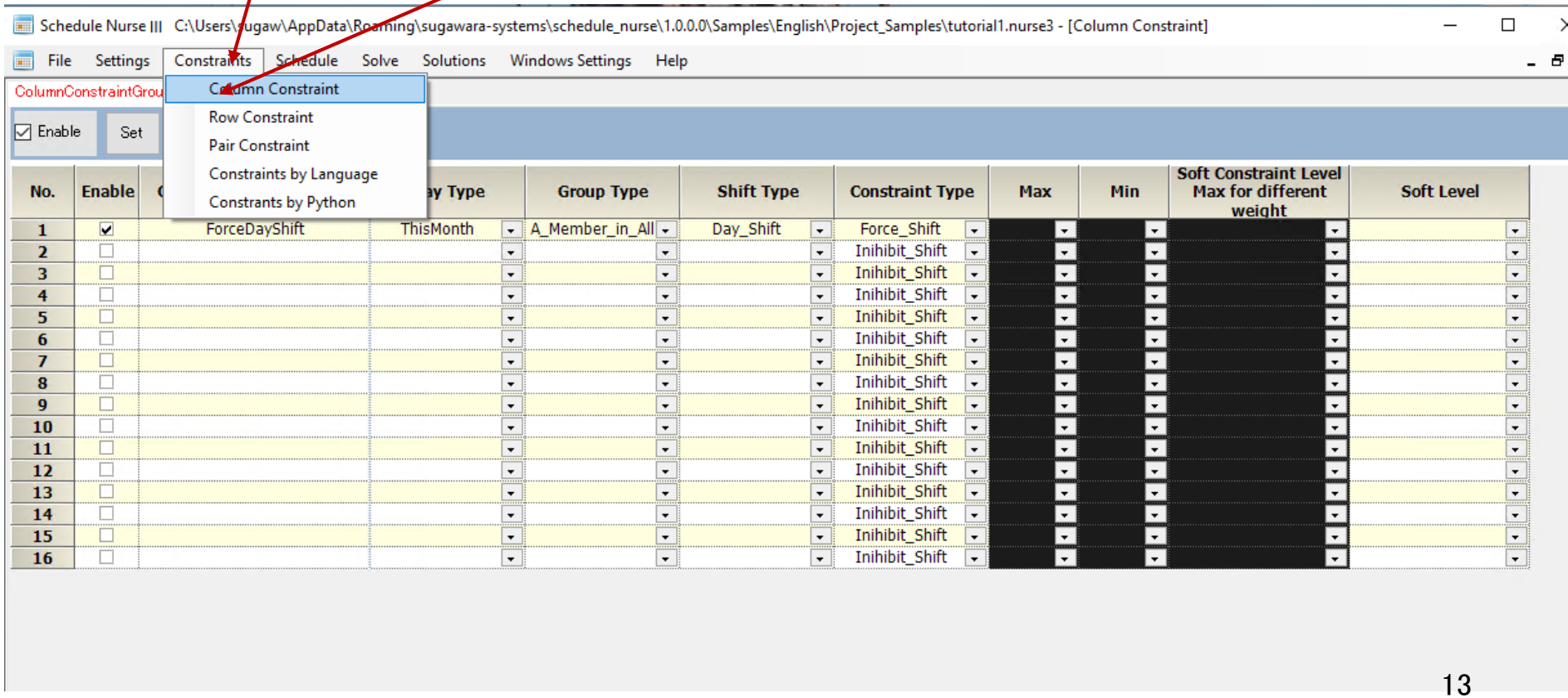
You can change the layout as shown below.





Column constraints

There is only one constraint in this project. Let's take a look.
Click "Constraints" → "Column constraints"

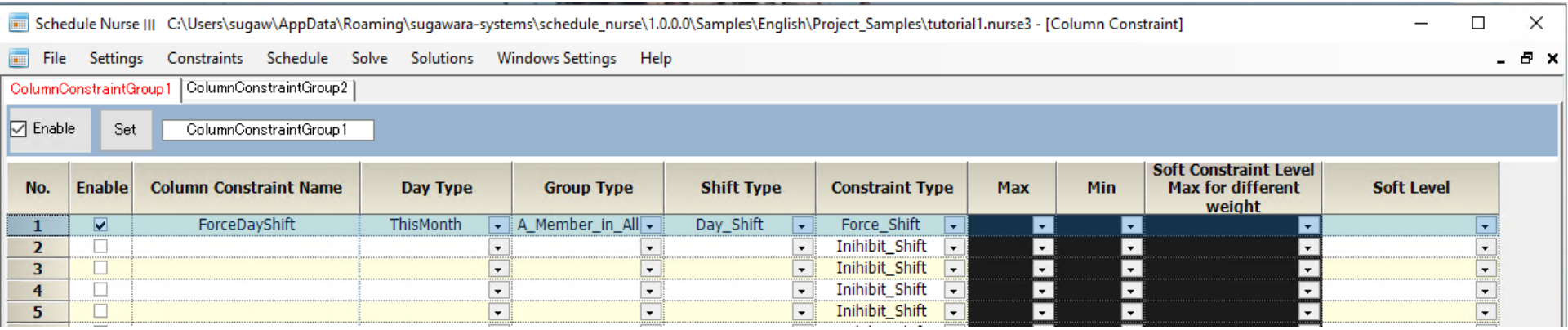


Description of the column constraint

This is the next screen. There is one constraint written. “ForceDayshift" is an arbitrary user-specified name for the constraint. The meaning of the constraint is

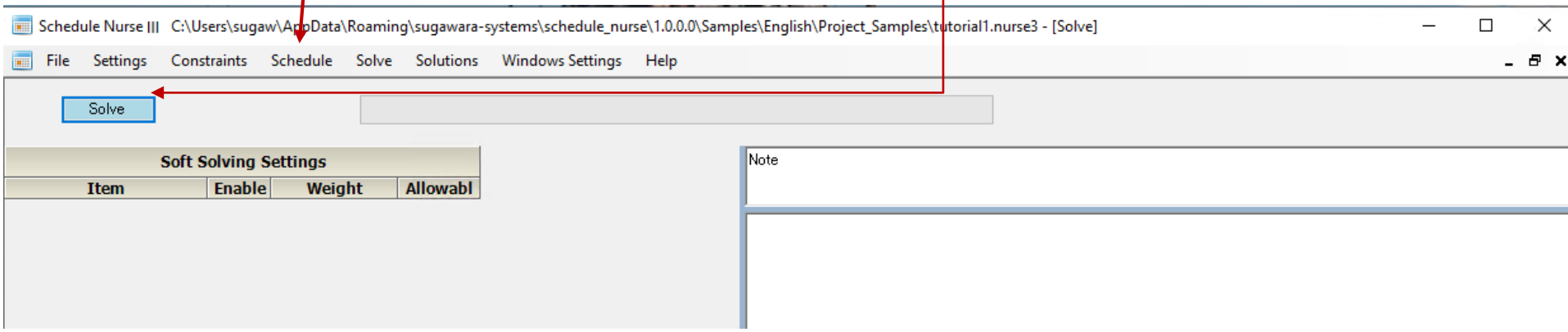
- [this month],
- for [all employees],
- for [day shifts],
- perform [Force_Shift]

It's not that hard after all!



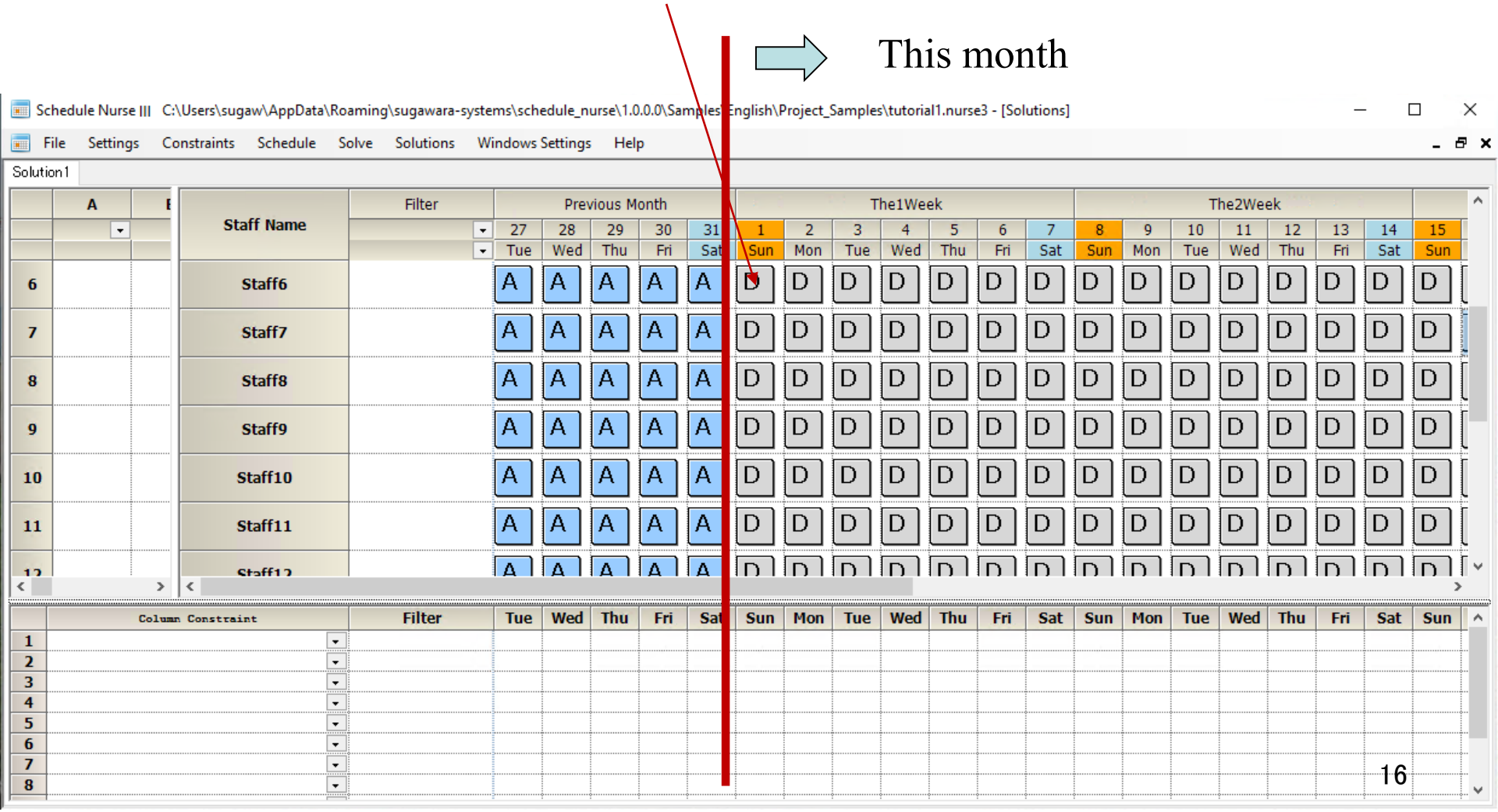
Finding the solution

Click on Find solution here, and then click the Find solution button.



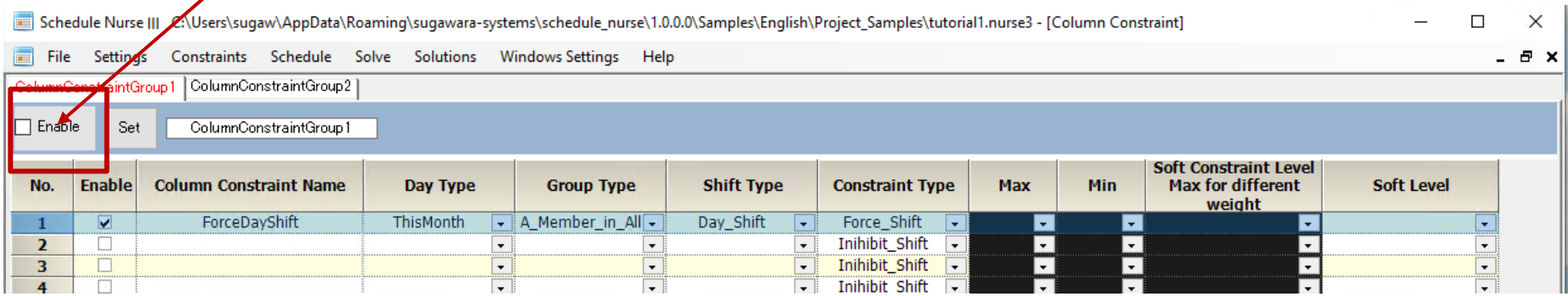
The screen after finding the solution

Indeed, all staff members work “DayShift” this month.



Turning column constraint groups on / off

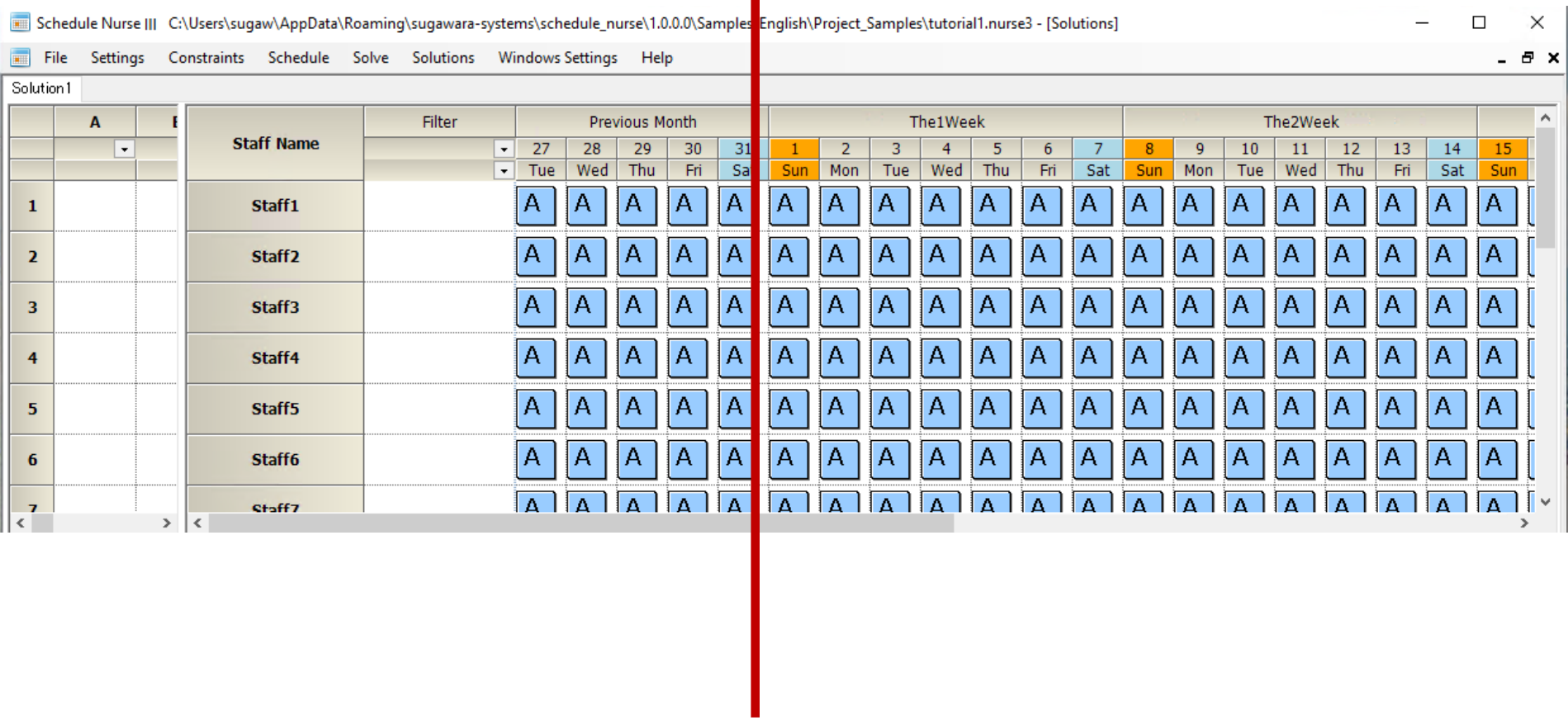
There is only one column constraint here, but you can also write multiple column constraints. The column constraints on this page are called Column Constraint Group 1. (You can name the group however you want.)
You can also turn off the constraint on the enforcement test itself by clicking to remove the check mark from the "Apply" box. Let's try it out. Click "Apply." Let's try to find the solution again and see how it changes.



The “Find solution” screen without constraints

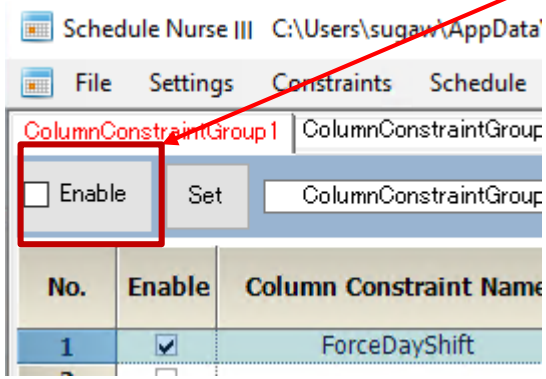
It is no longer true that all staff members are on the “DayShift” this month.

This month

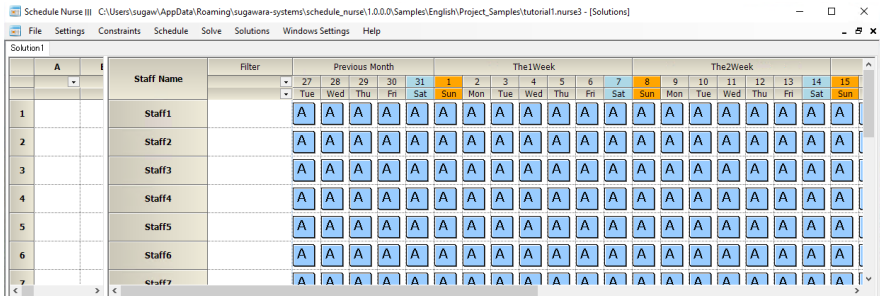


The difference between having a constraint or not

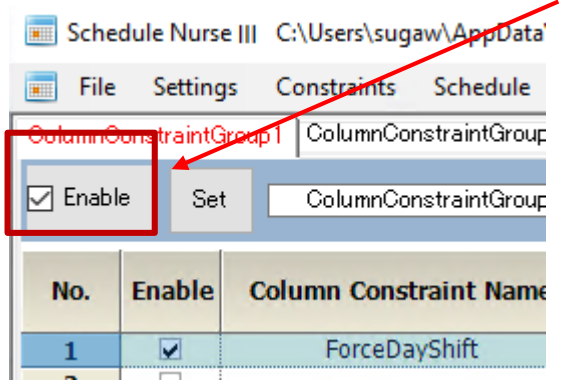
There is a change in the way the solution appears depending on whether there is a constraint or not. Try and see it yourself.

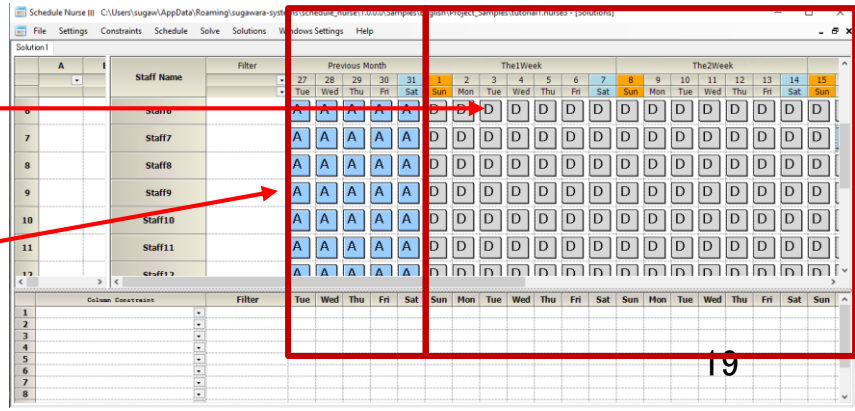


■ It is not clear what is going to get assigned when there are no constraints. The right screen just happened to turn out like this, and it might have turned out differently depending on the environment.



■ When there is a constraint, all staff members work "DayShift" this month. However, there was no constraint for previous month, so we cannot predict what will get assigned.





When you don’t place constraints

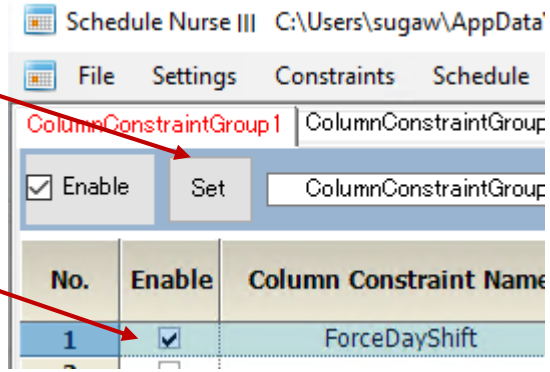
You cannot predict what gets assigned. In other words, you cannot control assignments without the constraint. So, you need to place some constraints (since there is nothing to control it).

We state this again, as it is especially important.

Turning individual constraints on and off

To turn off individual constraints, uncheck the "Apply" box and click the "Set" button.
To turn on individual constraints, check the "Apply" box and click the "Set" button.

Note that your settings won't be effective if you don't click the "Set" button.
(This applies for all constraints that appear later on as well.)

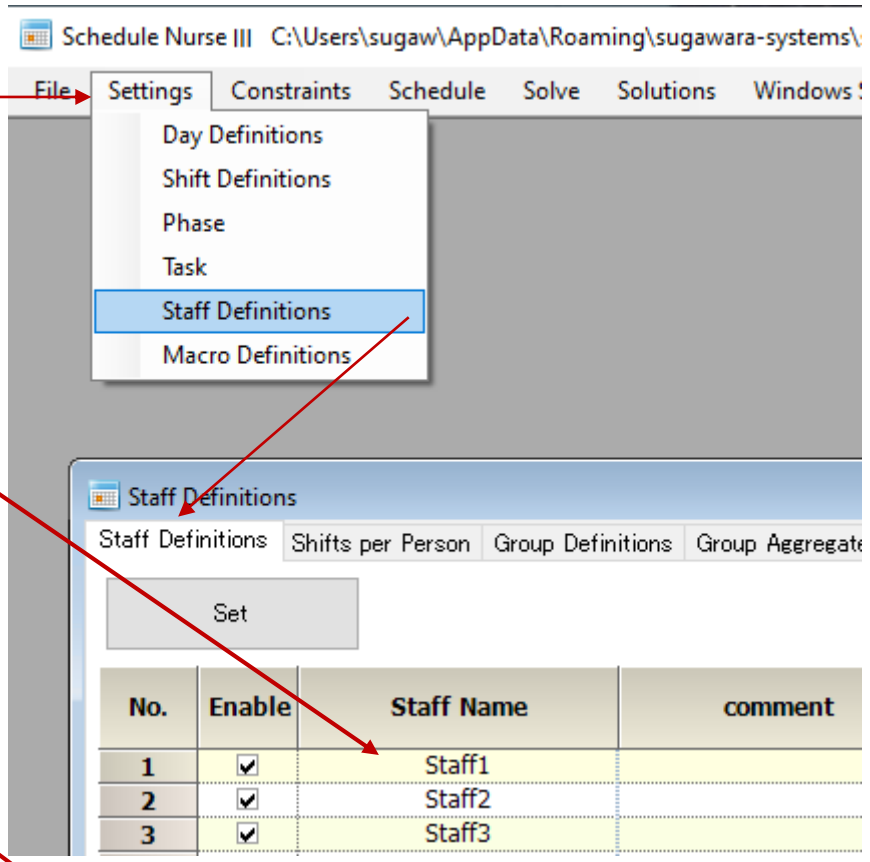


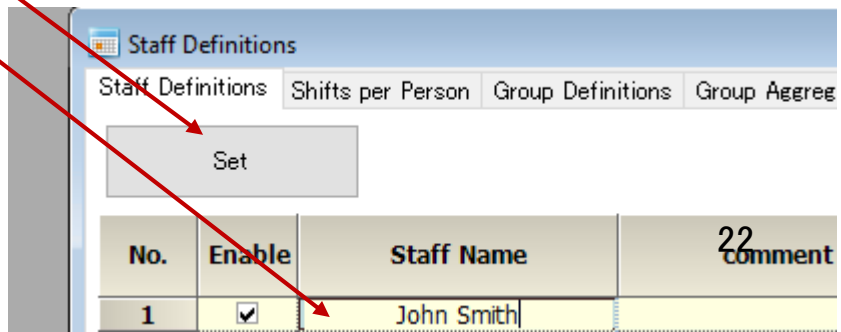
Tutorial2 Changing staff member names

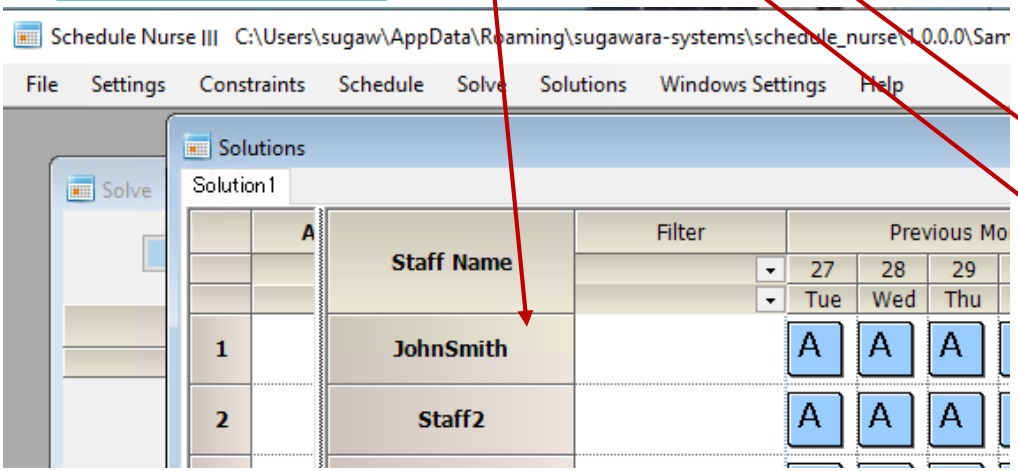
Click on Settings→ Staff Definitions→ Staff Definitions→ Staff Name1. Click again to remove the blue color and make it editable. Try typing in any name.

•After clicking the "Set" button, try to find a solution.

•See for yourself that the staff member names change in the Solution screen.





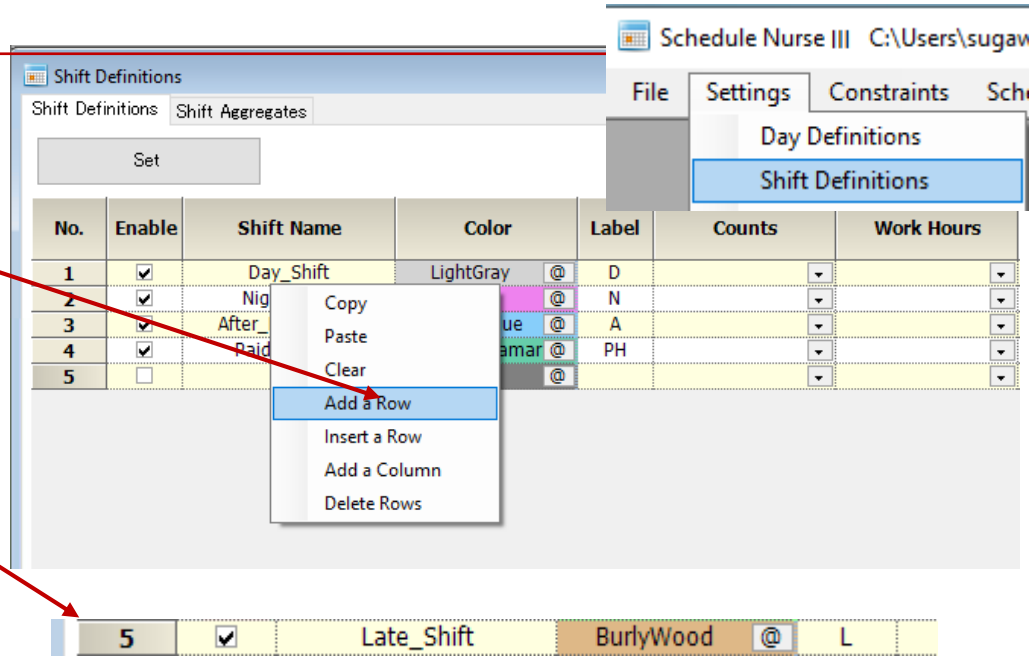


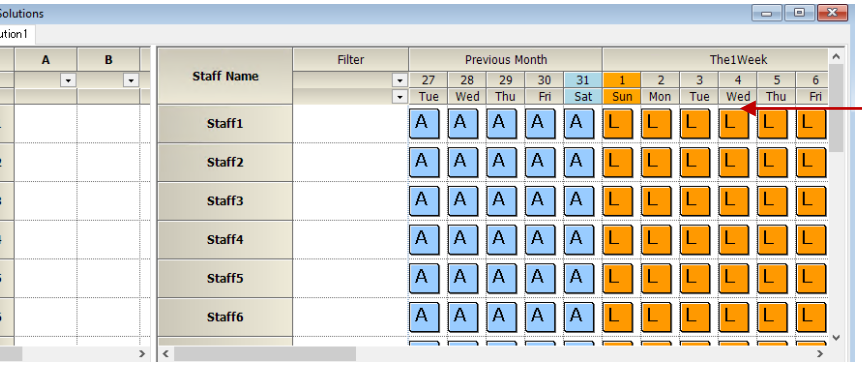
Tutorial2 Adding Shifts

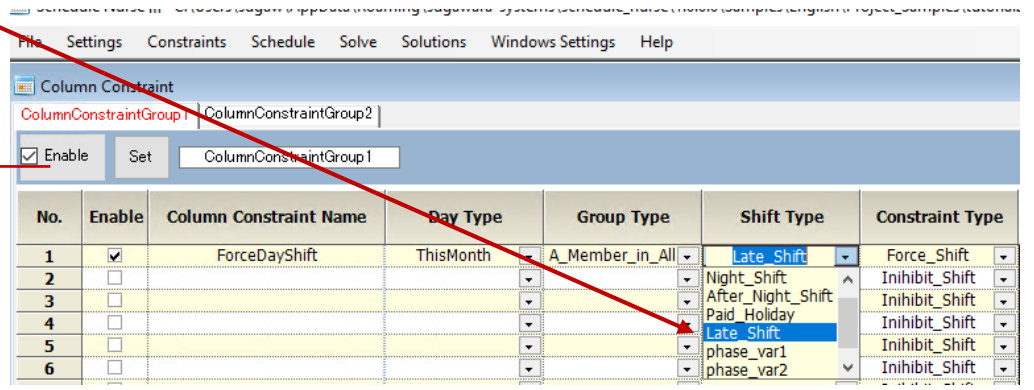
Go to Settings → Shift Definitions → right click inside the Shift Definitions table and a menu will appear. Add a Row.
We added a Late_Shift to try it out.

If you look at the column constraints after clicking the Set button, you will see the late shift we just added in a shift type column.

See for yourself that finding a solution after you click the Set button produces addressed solution with forced Late_Shift this month.

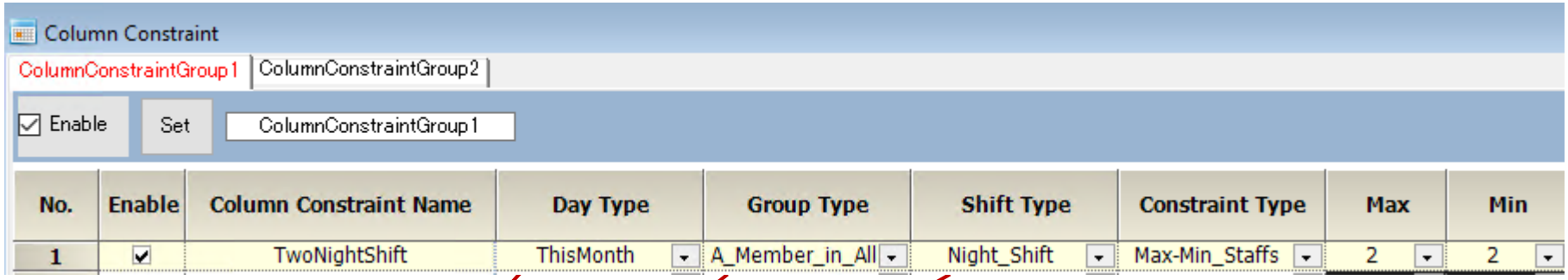






Tutorial3 Cardinal constraints

A constraint where a number is counted is called a cardinal constraint. For example, this is the constraint we use where there are 2 staff members on the night shift. Tutorial 3 shows an example of a cardinal number constraint. Let's open the column constraint from Tutorial 3.



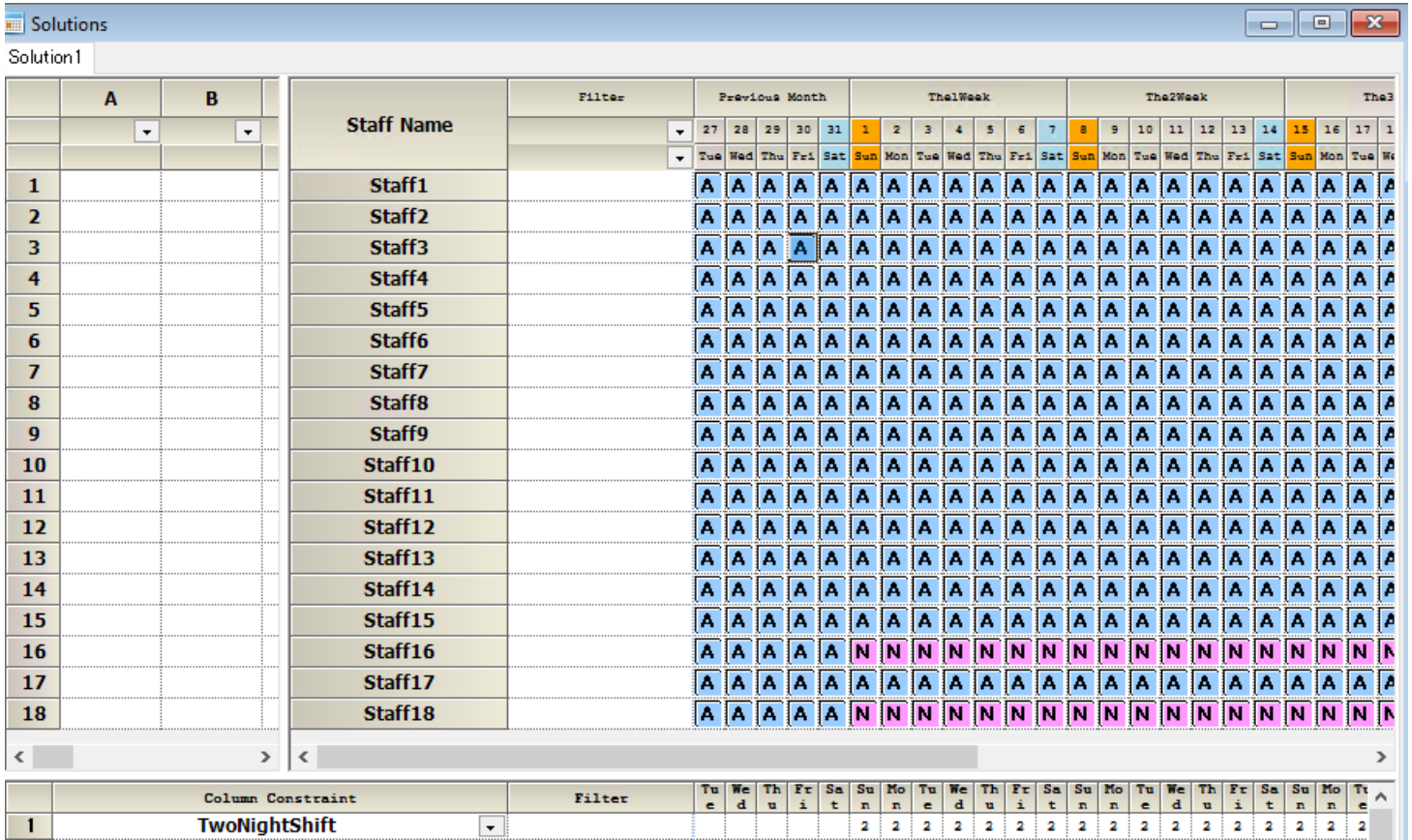
The constraint type is the maximum and minimum staff number. Both are set to 2, so this instruction means

- [this month],
- for [all staff members],
- set the [night shift]
- for 2 people.

Let's check it by finding a solution.

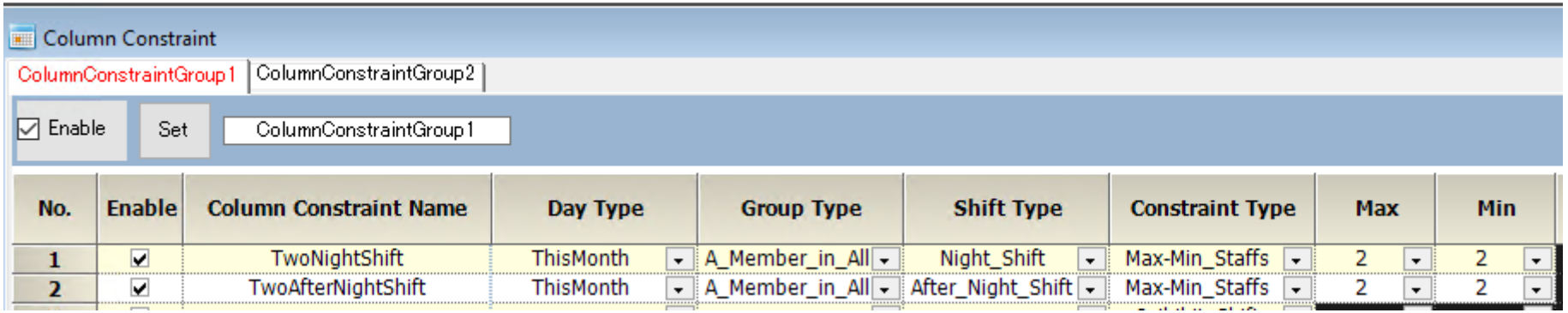
The solution for Tutorial3

We can see that we have Two “Night Shift” this month, which results from the column constraint we described. The screen's solution is focused on the two staff members in the lower part, as below. It may differ from your screen. The only constraint that is now in place is for two people in the night shift. If the rule is satisfactory, the software is working correctly.



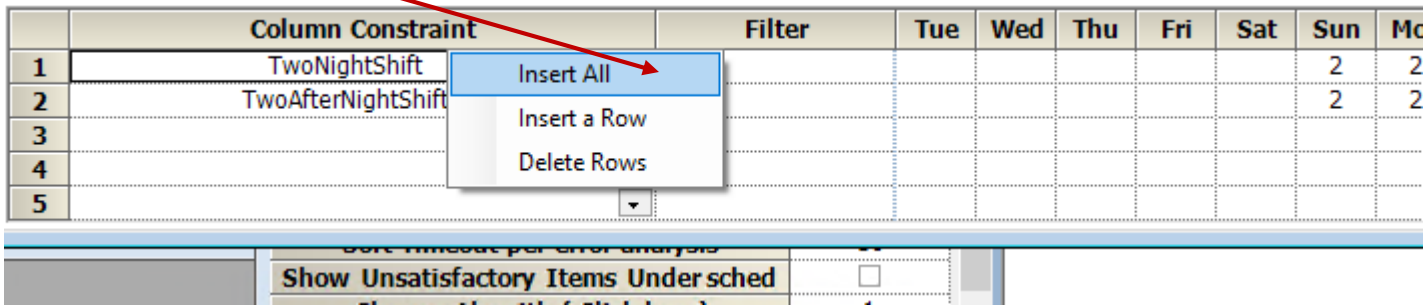
Tutorial3 Adding a column constraint

Add the following statement to secure two people for the day after the night shift.



Click on the Set button and then find a solution.

Insert All by right-clicking menu, is convenient for adding undisplayed constraints automatically.



Tutorial4

Open Tutorial 4 and find a solution. If you look at the column constraints, you can see that two people are assigned for both the night shift and the day after.

Column Constraint

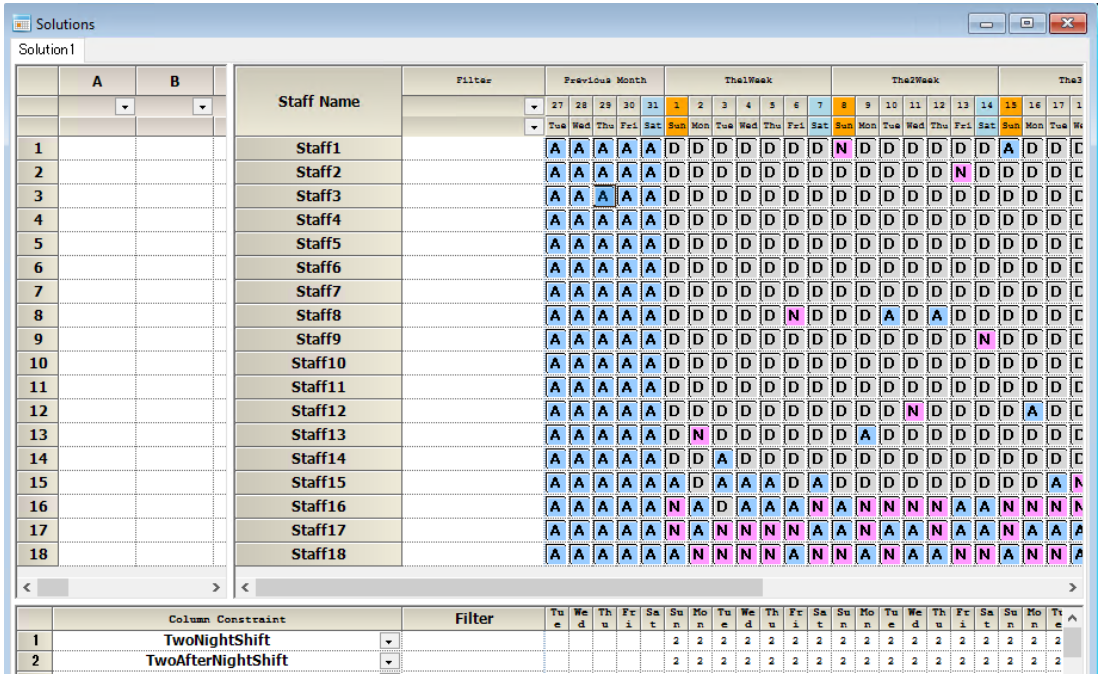
ColumnConstraintGroup1 | ColumnConstraintGroup2

Enable | Set | ColumnConstraintGroup1

No.	Enable	Column Constraint Name	Day Type	Group Type	Shift Type	Constraint Type	Max	Min
1	☑	TwoNightShift	ThisMonth	A_Member_in_All	Night_Shift	Max-Min_Staffs	2	2
2	☑	TwoAfterNightShift	ThisMonth	A_Member_in_All	After_Night_Shift	Max-Min_Staffs	2	2

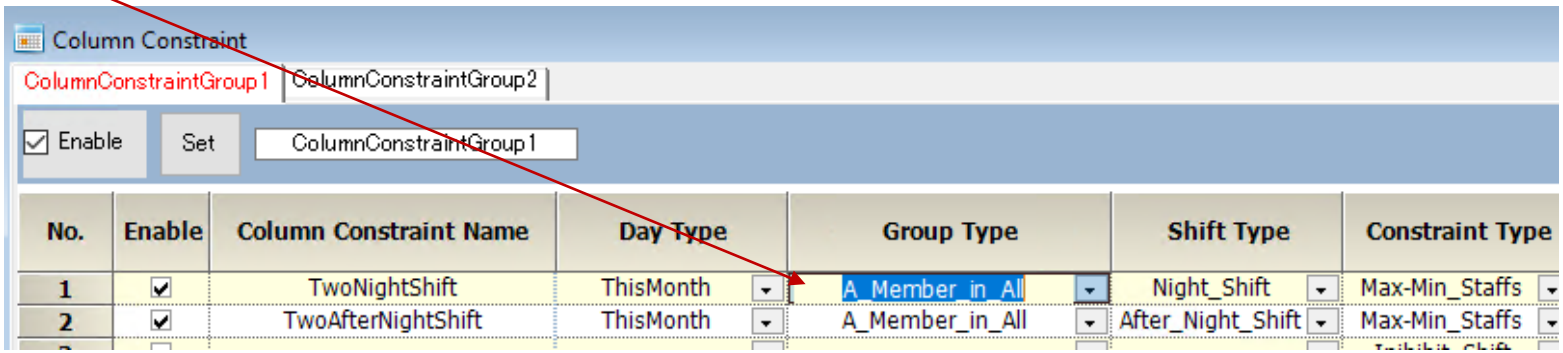
The picture on the right is the screen after finding a solution.

The pattern of night shifts is explained in two-shift patterns.



Defining a group type

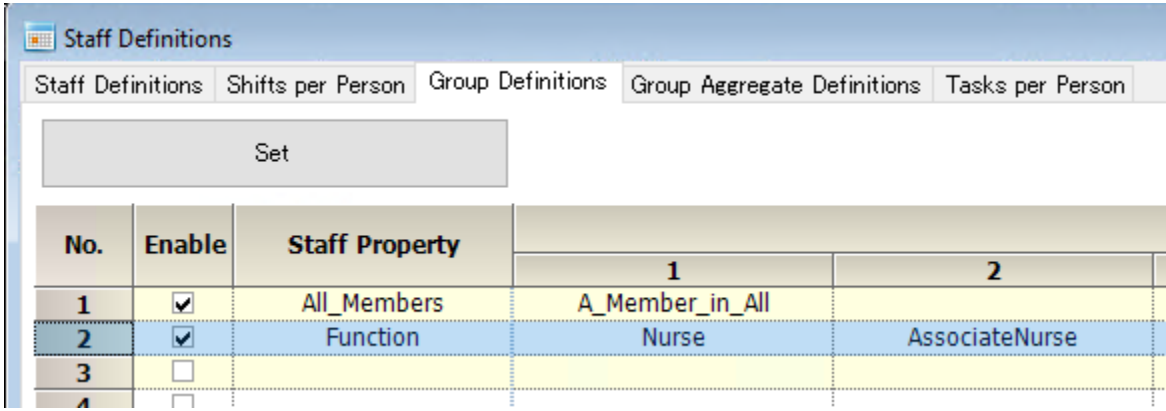
We will add a constraint that makes it so that at least one nurse is on Night Shift out of nurses and assistant nurses. Currently, the only group type option is "A member in all." We will show you how to add the nurse group and assistant nurse separately.



No.	Enable	Column Constraint Name	Day Type	Group Type	Shift Type	Constraint Type
1	☑	TwoNightShift	ThisMonth	A_Member_in_All	Night_Shift	Max-Min_Staffs
2	☑	TwoAfterNightShift	ThisMonth	A_Member_in_All	After_Night_Shift	Max-Min_Staffs

Go to Settings → Staff Definitions → Group Definitions to get to the Group Definitions screen.

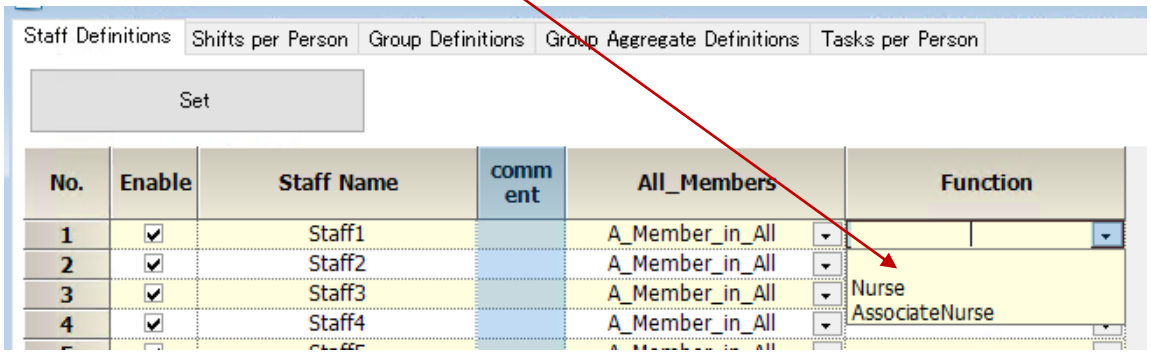
Enter the information as shown in the blue part on the right, then click the Set button. 。



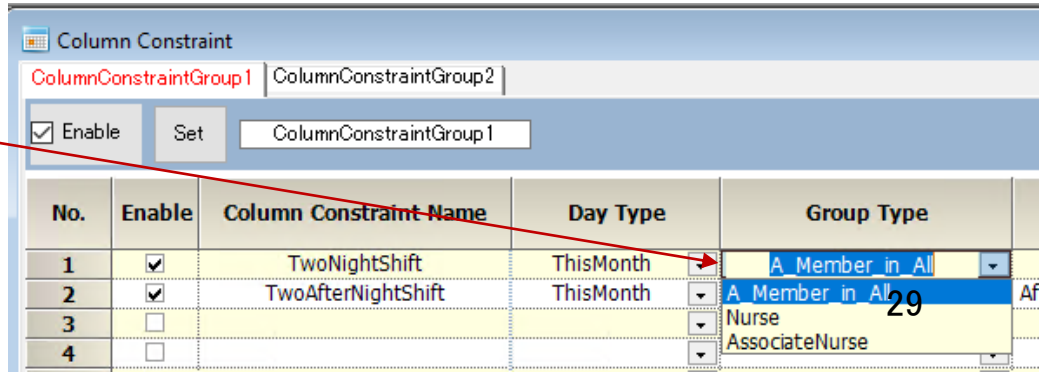
No.	Enable	Staff Property	1	2
1	☑	All_Members	A_Member_in_All	
2	☑	Function	Nurse	AssociateNurse
3	☐			

Defining the group type 2

If you look at the Staff Definitions page, you'll see an attribute section called Function where you can select alternatives. With this, you can set up each staff member. You can leave it blank for those who do not fall into this category (e.g., administrators).

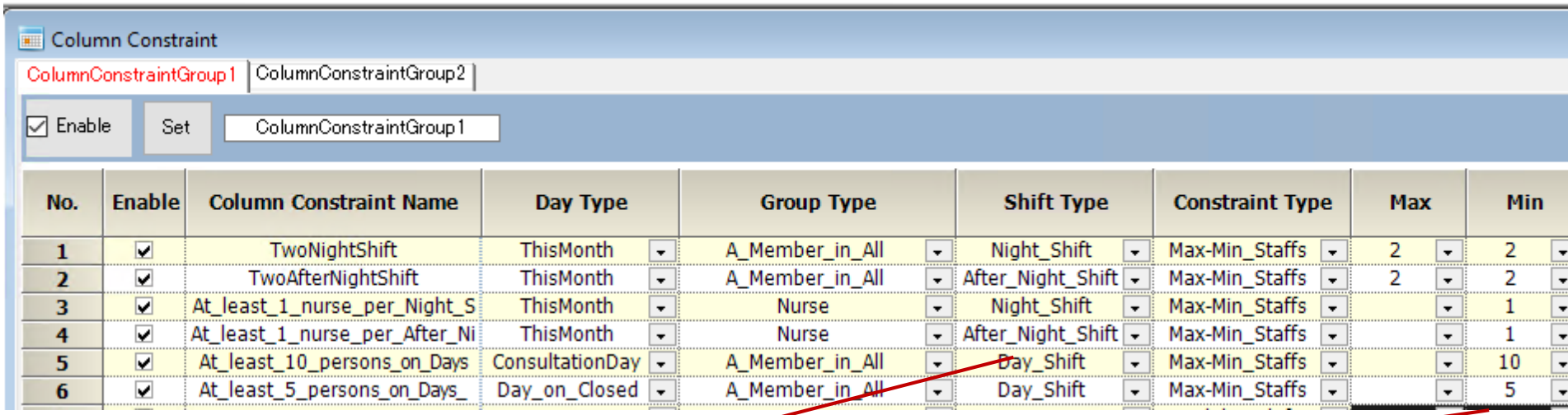


There is now a selection for group types in column constraints as well.
This way, you can create whichever group attributes you want. You can select only those who have the attribute and apply the constraint to them.



Tutorial5 Setting the day of the week

Open Tutorial 5 and see its column constraints. We added No.5 and 6 on the previous page.

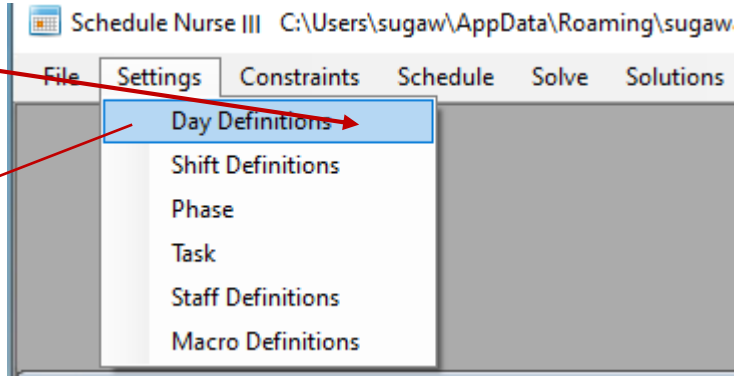


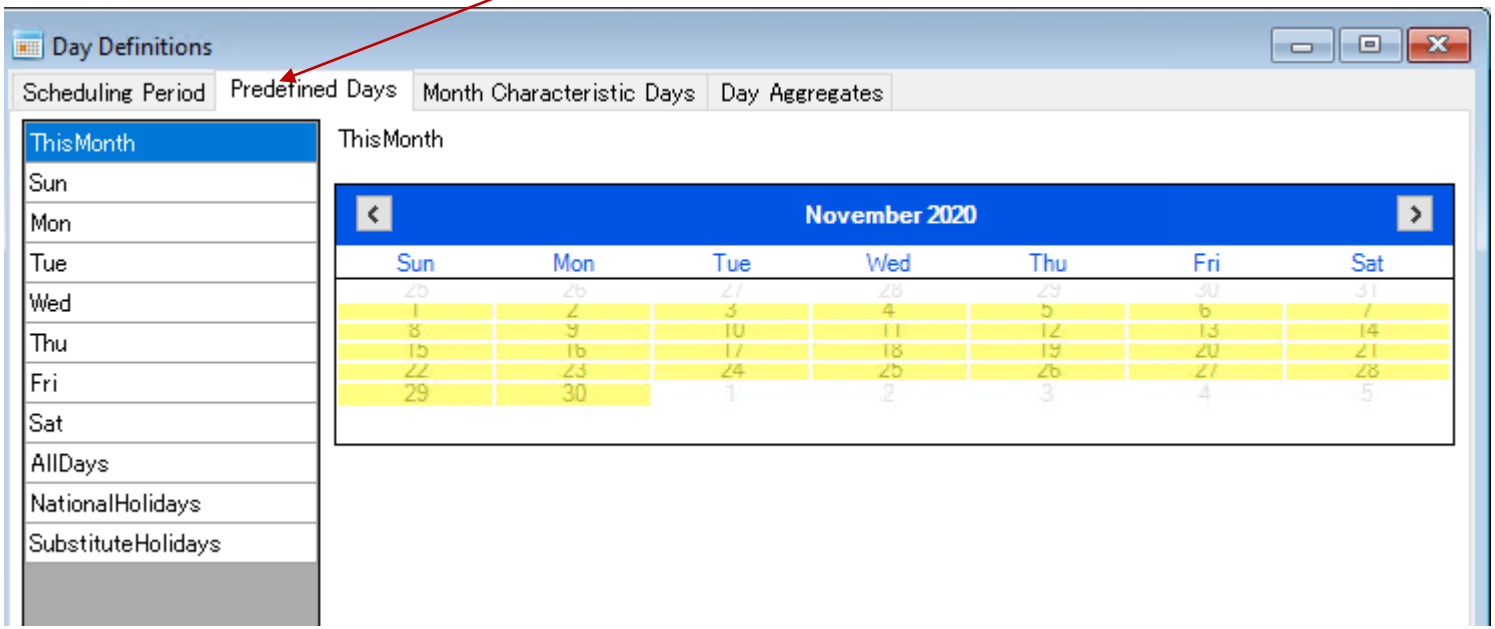
No.	Enable	Column Constraint Name	Day Type	Group Type	Shift Type	Constraint Type	Max	Min
1	☑	TwoNightShift	ThisMonth	A_Member_in_All	Night_Shift	Max-Min_Staffs	2	2
2	☑	TwoAfterNightShift	ThisMonth	A_Member_in_All	After_Night_Shift	Max-Min_Staffs	2	2
3	☑	At_least_1_nurse_per_Night_S	ThisMonth	Nurse	Night_Shift	Max-Min_Staffs		1
4	☑	At_least_1_nurse_per_After_Ni	ThisMonth	Nurse	After_Night_Shift	Max-Min_Staffs		1
5	☑	At_least_10_persons_on_Days	ConsultationDay	A_Member_in_All	Day_Shift	Max-Min_Staffs		10
6	☑	At_least_5_persons_on_Days_	Day_on_Closed	A_Member_in_All	Day_Shift	Max-Min_Staffs		5

The new constraint is Day_Shift. An additional rule is applied, making it so that there are at least ten people on working days and at least five on weekends. Let's see how to set the days of the week, such as working days and weekends.

Tutorial5 Setting the day of the week 2

You will see the following by clicking on Settings → Day Definitions → Scheduling Period → ThisMonth. The section marked in yellow is the definition of the month.

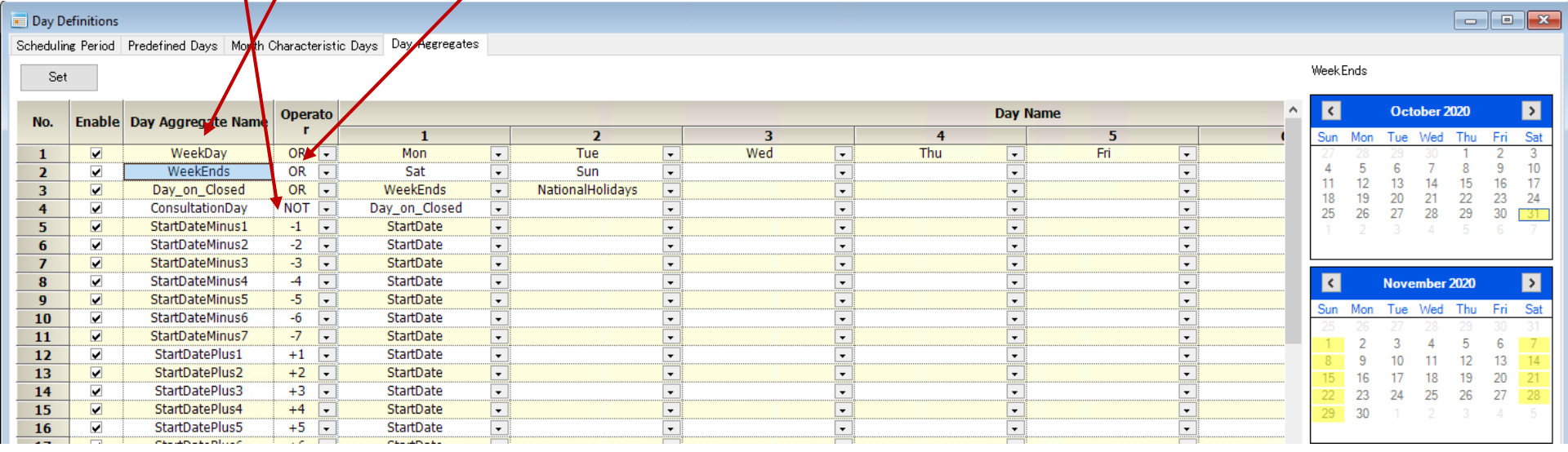




Tutorial5 Setting the day of the week 3

See the definition of a weekday. "WeekDay" can be Monday, Tuesday, Wednesday, Thursday, or Friday. We can define "WeekDay" using the operator OR. And "Weekends" means Saturday or Sunday. "Day_on_Closed" is weekends or holidays. We can determine the working days using “Day_on_Closed”. Working days (Consultation days) are the negation of "Day_on _Closed," so we use the NOT operator. In this way, we can create any day of the week by themselves. Don't forget to click on the Set button after you've made changes.

You can tell if your weekday definition is correct by looking at the calendar.

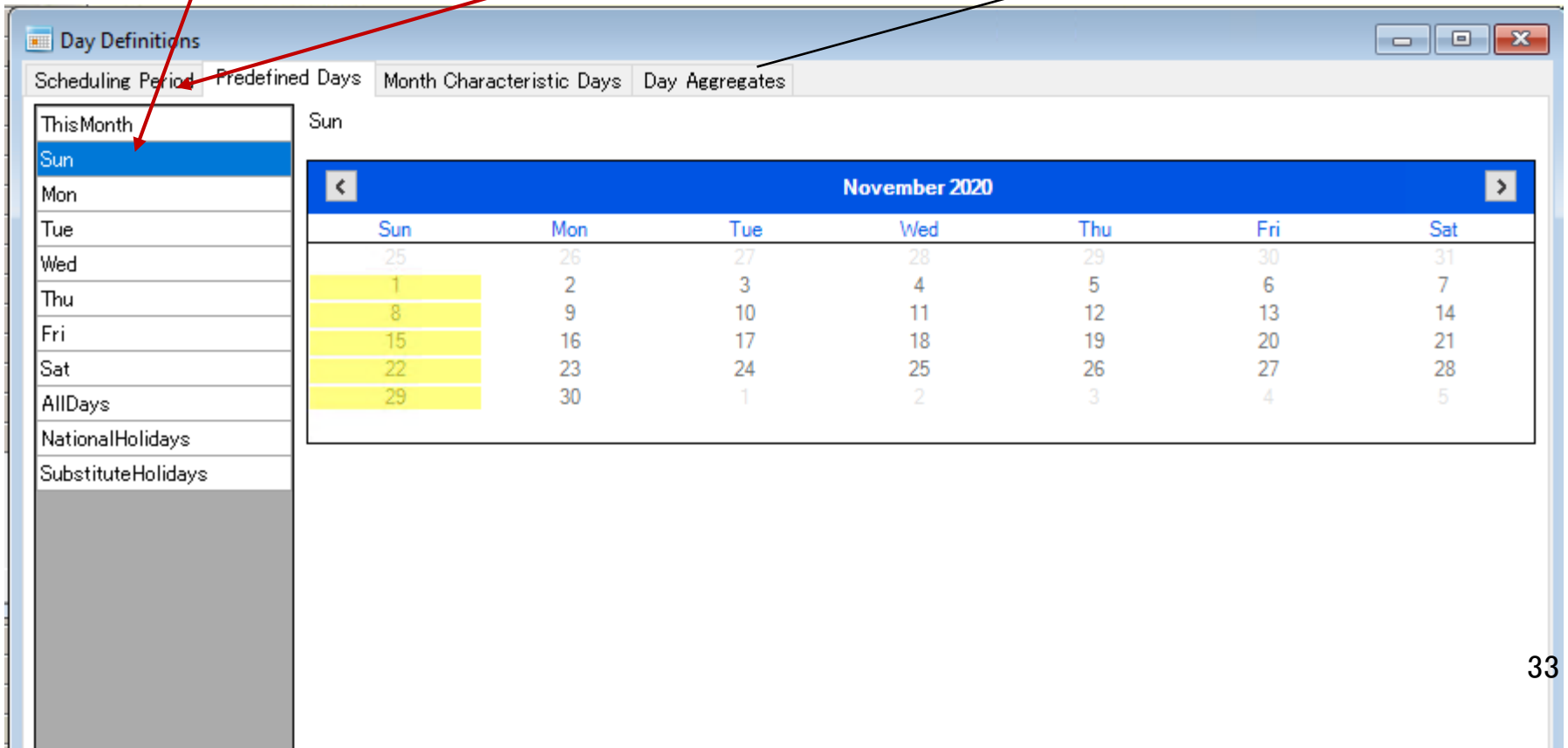


No.	Enable	Day Aggregate Name	Operator	Day Name 1	2	3	4	5
1	☑	WeekDay	OR	Mon	Tue	Wed	Thu	Fri
2	☑	WeekEnds	OR	Sat	Sun			
3	☑	Day_on_Closed	OR	WeekEnds	NationalHolidays			
4	☑	ConsultationDay	NOT	Day_on_Closed				
5	☑	StartDateMinus1	-1	StartDate				
6	☑	StartDateMinus2	-2	StartDate				
7	☑	StartDateMinus3	-3	StartDate				
8	☑	StartDateMinus4	-4	StartDate				
9	☑	StartDateMinus5	-5	StartDate				
10	☑	StartDateMinus6	-6	StartDate				
11	☑	StartDateMinus7	-7	StartDate				
12	☑	StartDatePlus1	+1	StartDate				
13	☑	StartDatePlus2	+2	StartDate				
14	☑	StartDatePlus3	+3	StartDate				
15	☑	StartDatePlus4	+4	StartDate				
16	☑	StartDatePlus5	+5	StartDate				

Tutorial5 Setting the day of the week 4

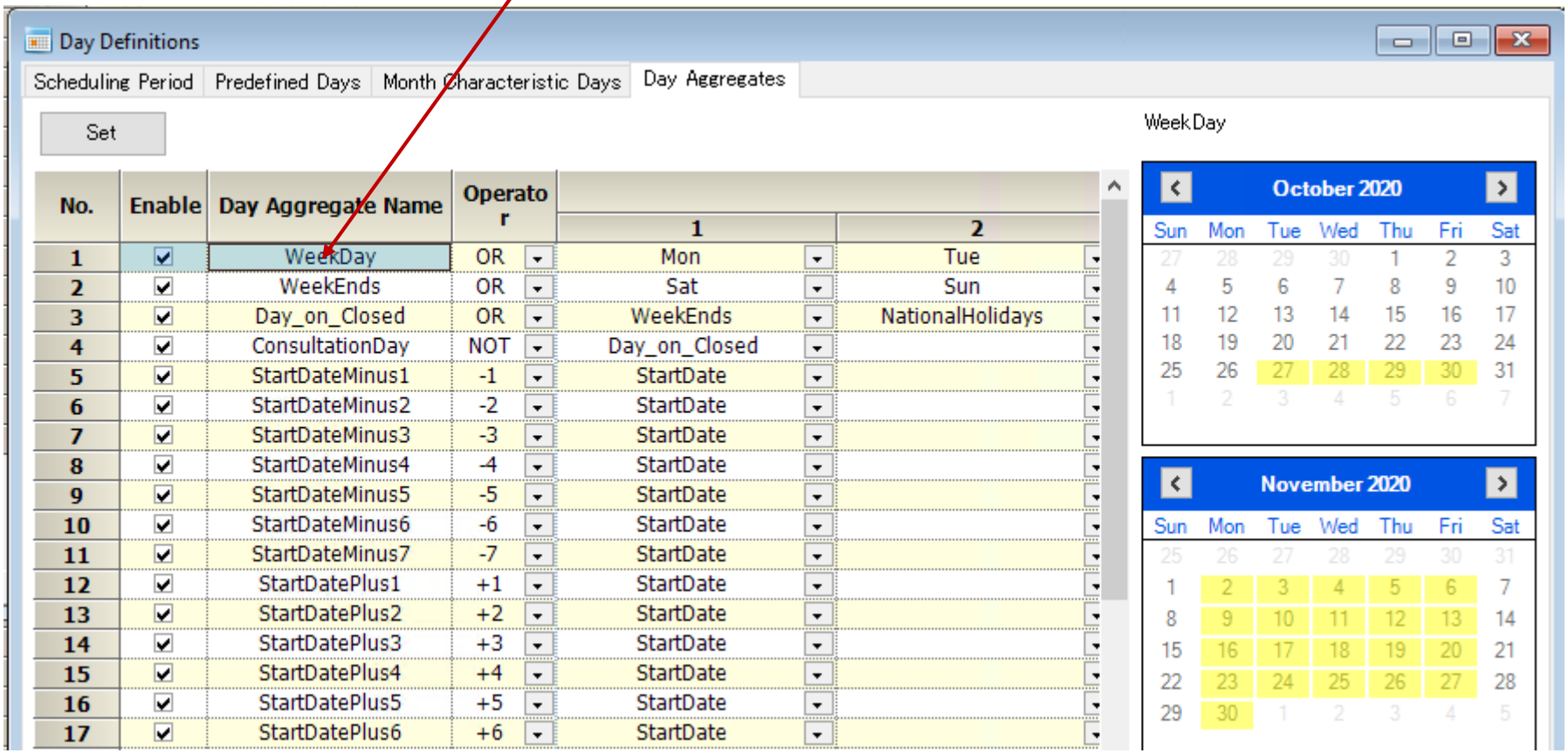
Click on Sunday. The calendar is displayed.

These weekdays are determined when you set Scheduling Period and cannot be changed. On the other hand, the user can freely define the weekdays formed by Day Aggregates.



Tutorial5 Check your synthesis by the Calendar

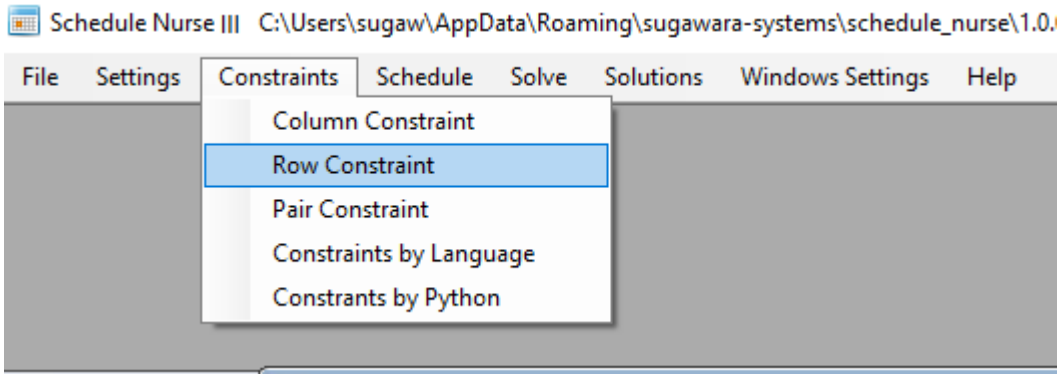
Click on Day Aggregates → WeekDay. The yellow on the calendar represents that definition.



No.	Enable	Day Aggregate Name	Operator	1	2
1	☑	WeekDay	OR	Mon	Tue
2	☑	WeekEnds	OR	Sat	Sun
3	☑	Day_on_Closed	OR	WeekEnds	NationalHolidays
4	☑	ConsultationDay	NOT	Day_on_Closed	
5	☑	StartDateMinus1	-1	StartDate	
6	☑	StartDateMinus2	-2	StartDate	
7	☑	StartDateMinus3	-3	StartDate	
8	☑	StartDateMinus4	-4	StartDate	
9	☑	StartDateMinus5	-5	StartDate	
10	☑	StartDateMinus6	-6	StartDate	
11	☑	StartDateMinus7	-7	StartDate	
12	☑	StartDatePlus1	+1	StartDate	
13	☑	StartDatePlus2	+2	StartDate	
14	☑	StartDatePlus3	+3	StartDate	
15	☑	StartDatePlus4	+4	StartDate	
16	☑	StartDatePlus5	+5	StartDate	
17	☑	StartDatePlus6	+6	StartDate	

Tutorial6 Row constraints

Open Constraints → Row Constraints.



Tutorial6 Two-shift patterns

Open Constraints → Row Constraints → Two-Shift.

Row Constraint

Consecutive_Off_Days | Flattening | Two-Shift | CardinalityConstraint

Enable | Set | Two-Shift | D | N | A | PH

No.	Enable	Row Constraint Name	Day Type	Group Type	Constraint Type	Shift Pattern						
						0	1	2	3	4	5	6
1	☑	NightShift_followed_by_After_Night_Shift	FromStartDateMinus1	A_Member_in_All	Inhibit_Pattern	☐ N	☑ A	☐	☐	☐	☐	☐
2	☑	After_Night_Shift_preceded_by_Nighift_Shift	FromStartDateMinus1	A_Member_in_All	Inhibit_Pattern	☑ N	☐ A	☐	☐	☐	☐	☐
3	☑	After_Nighit_Shift_followed_by_Paid_Holiday	FromStartDateMinus1	A_Member_in_All	Inhibit_Pattern	☐ A	☑ PH	☐	☐	☐	☐	☐

Three constraints are defined.

"✓" means negation(Boolean NOT operator).

The first constraint prohibits the pattern of "Night_Shift," followed by NOT operation of “After_Night_Shift”.

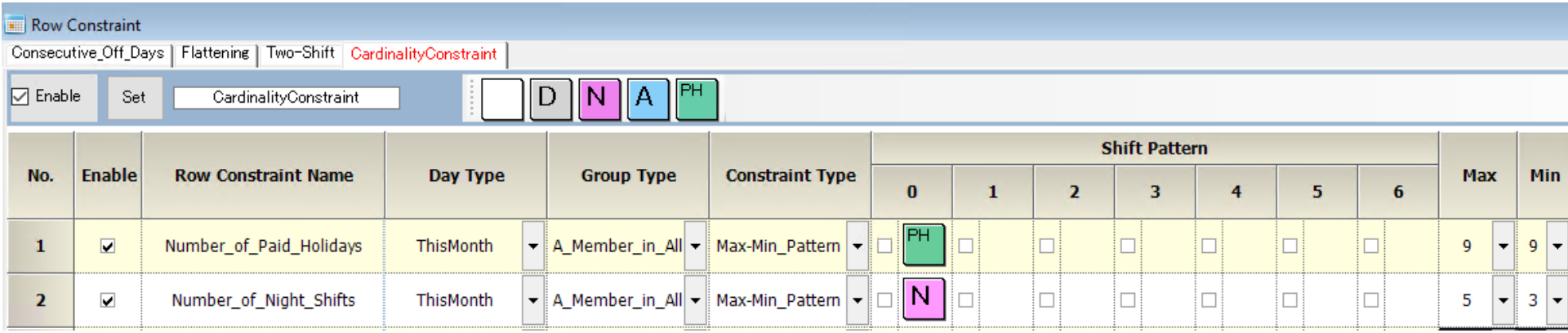
The second constraint prohibits the pattern of NOT operation of "Night_Shift," followed by “After Night Shift”.

As a result, "Night_Shift," followed by "After_Night_Shift," becomes mandatory with those constraints.

Third constraint forces "Paid_Day" must be followed by “After_Night_Shift”.

Tutorial 6 Cardinality Constraint

Open Constraints → Row Constraints → CardinalityConstraint



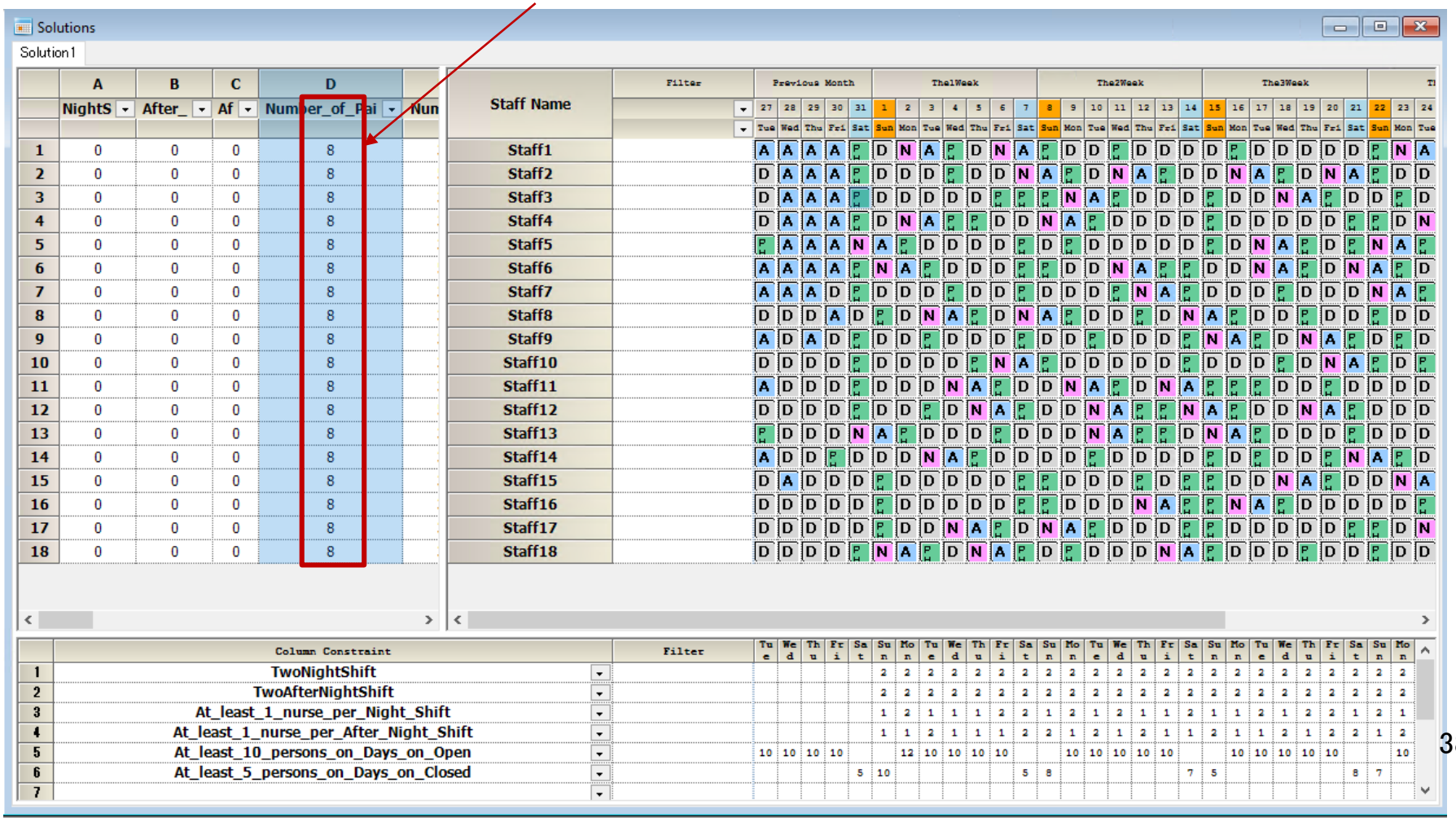
No.	Enable	Row Constraint Name	Day Type	Group Type	Constraint Type	Shift Pattern 0	1	2	3	4	5	6	Max	Min
1	☑	Number_of_Paid_Holidays	ThisMonth	A_Member_in_All	Max-Min_Pattern	PH							9	9
2	☑	Number_of_Night_Shifts	ThisMonth	A_Member_in_All	Max-Min_Pattern	N							5	3

The first constraint allocates 9 “Paid Holidays” for all staff members this month.

The second constraint allocates 3-5 “Night Shift” for all staff members this month.

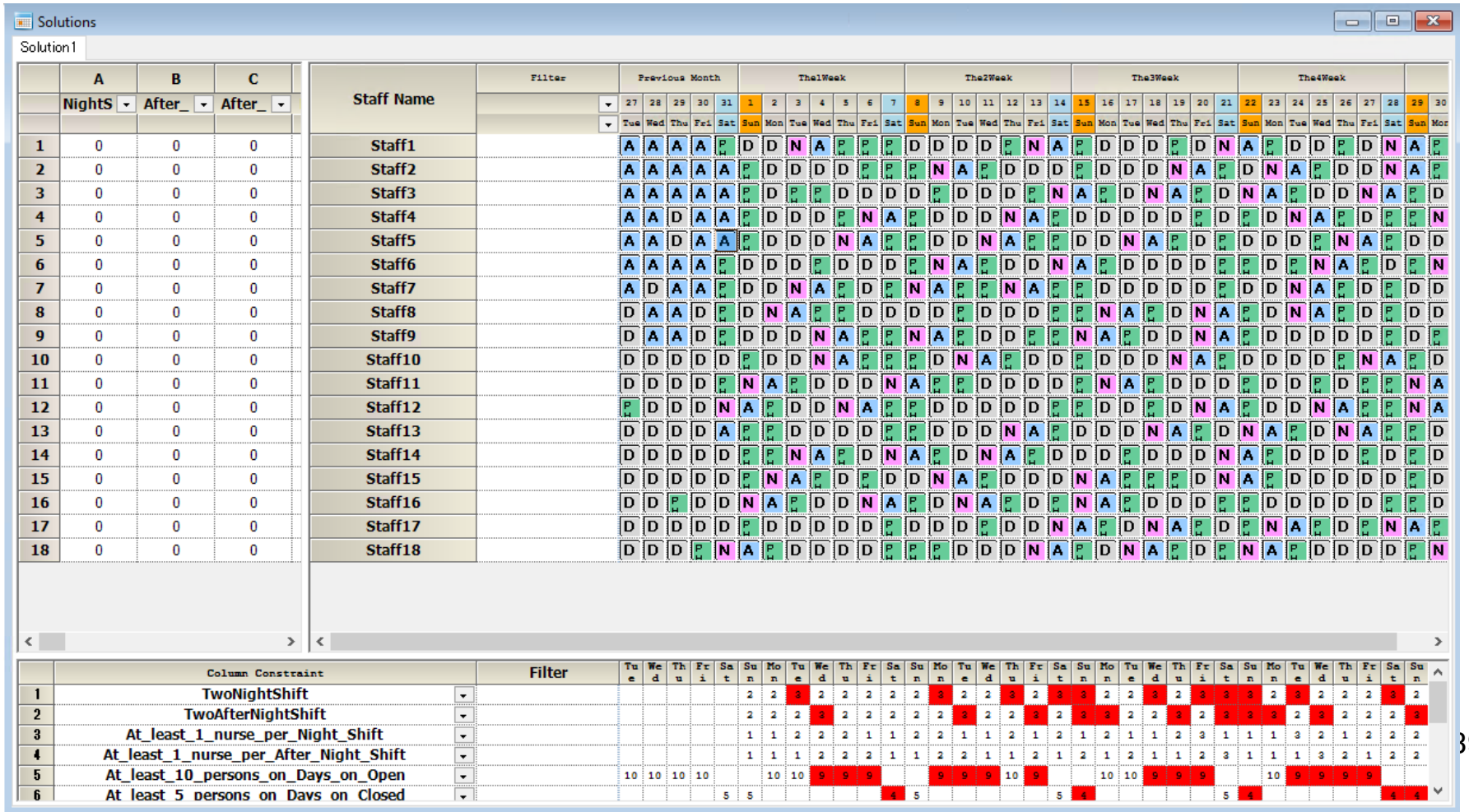
Tutorial6 Changing the number of night shifts and public holidays

Let's try to change the number of public holidays to 8 and find a solution. Don't forget to click on the Set button.
Make sure that the number is eight after finding the solution.



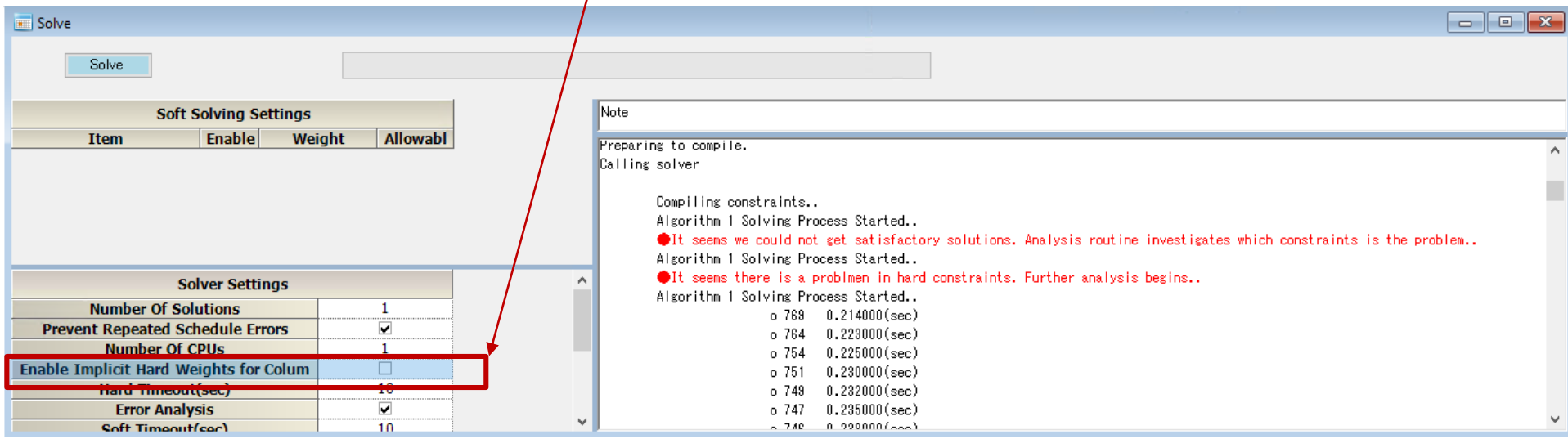
Tutorial6_Error

Open Tutorial6_Error and try to find a solution. You can see that there are many areas marked in red, as shown below. Red Mark shows the hard constraint is not satisfactory.



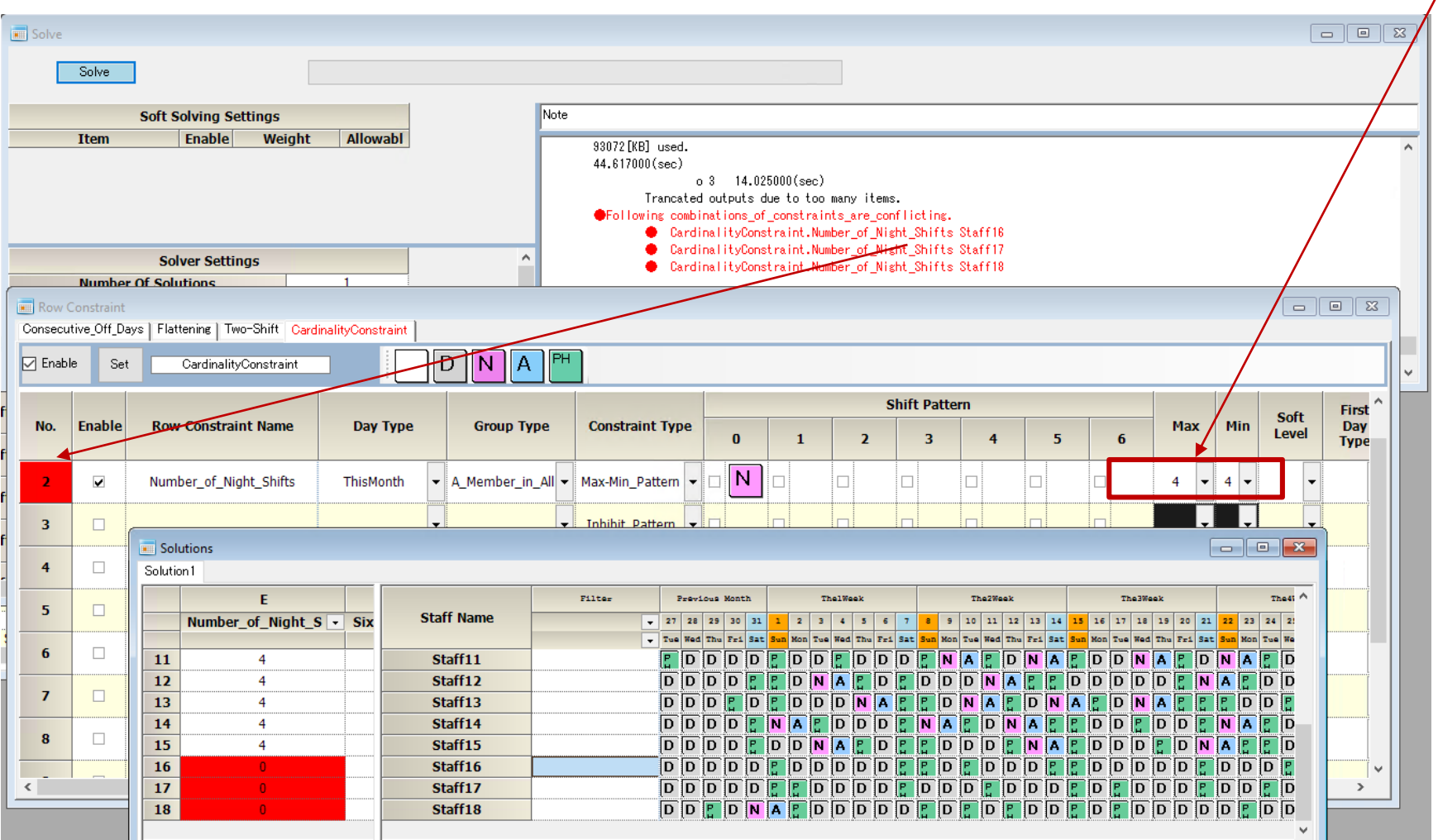
Tutorial6 Error 2

Now uncheck Enable Implicit Hard Weight Column and find a solution. It will take some time, but it will show an error, as on the screen on the bottom right.
Checking "Enable Implicit Hard Weight Column" makes softening the hard column constraints, which may result in an infeasible solution. We recommend unchecking it when we investigate conflicting rules and discover the real cause.



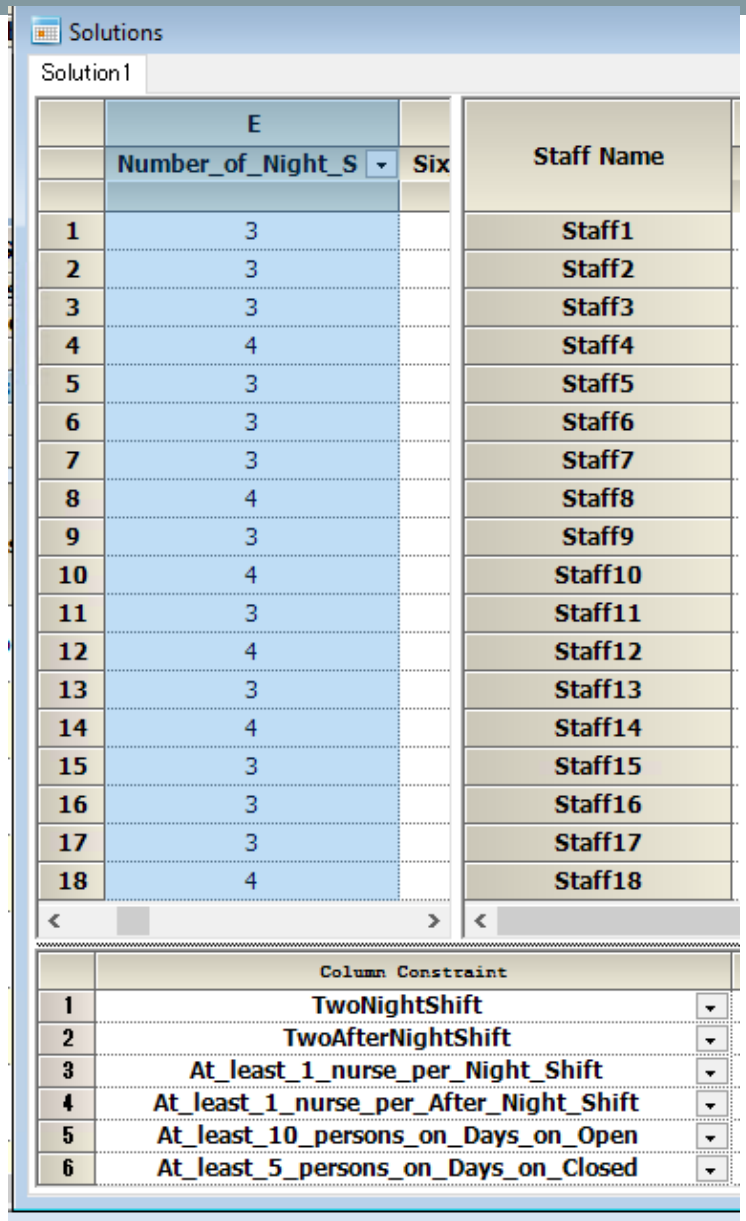
Tutorial6 Error 3

If you look at the lower right-hand side of the solution page, you will see "● ..." Double-click on the red line to open the constraint in question.The only difference between this project and the previous one is that the number of night shift entries is 4. Please set it to a maximum of 4 and a minimum of 3 and make sure that there is a solution.



Tutorial 6 Error 4

- This result shows that it is physically impossible to have everyone do four Night Shifts.
- We want to make everyone equal from the perspective of load leveling, but in reality, we need to give it some play, somewhere, as an inequality constraint.
- It is clear from the results on the right that in this example, 3-4 is an appropriate constraint.
- Thus, it is essential to adjust the constraints **while looking at the solution**.


Solutions

Solution1

	E		Staff Name
	Number_of_Night_S	Six	
1	3		Staff1
2	3		Staff2
3	3		Staff3
4	4		Staff4
5	3		Staff5
6	3		Staff6
7	3		Staff7
8	4		Staff8
9	3		Staff9
10	4		Staff10
11	3		Staff11
12	4		Staff12
13	3		Staff13
14	4		Staff14
15	3		Staff15
16	3		Staff16
17	3		Staff17
18	4		Staff18

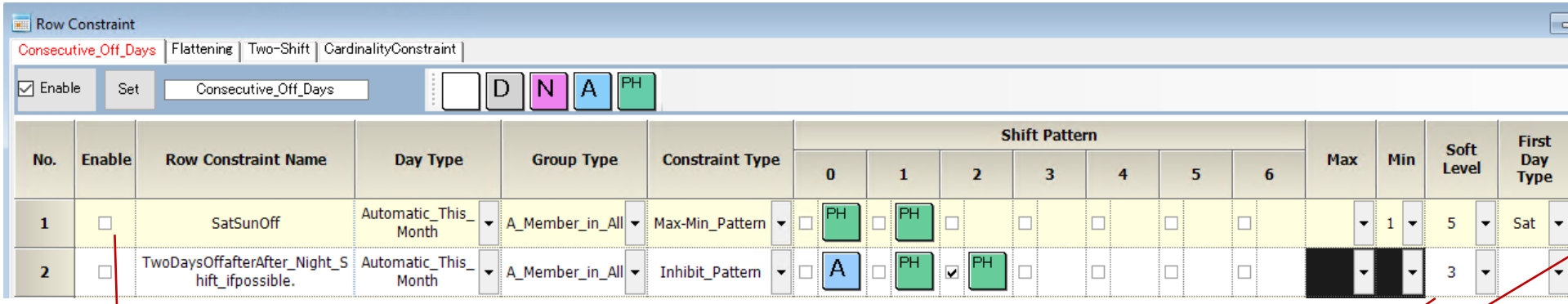
	Column Constraint
1	TwoNightShift
2	TwoAfterNightShift
3	At_least_1_nurse_per_Night_Shift
4	At_least_1_nurse_per_After_Night_Shift
5	At_least_10_persons_on_Days_on_Open
6	At_least_5_persons_on_Days_on_Closed

Tutorial6 Error Summary

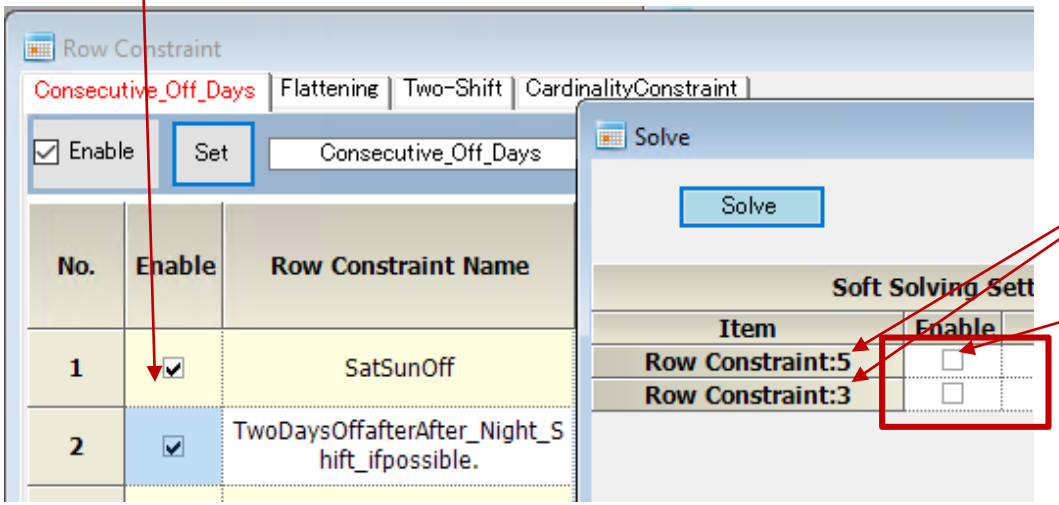
- If you see many red areas in a column constraint, suspect a hard constraint violation.
- Uncheck “Enable Implicit Hard Weight Column”, and discover the cause.
- Rework or soften (see below) the hard constraints.
- A single constraint violation can lead to errors in unexpected places. In constraint design, it is vital to ensure a solution every time you have written one constraint.
- Don't panic, even if there is no solution. Conflicting constraints may easily cause the problem. Let's get to the cause and brush up on rules, as we have seen in Tutorial6.

Tutorial7 Soft Constraints

Open Constraints → Row Constraints.



This constraint is a soft constraint. A soft constraint is a constraint with a number from 1 to 7 in the soft level section. For now, check the Apply box, click the Set button, and find a solution.



Check “Apply” and find a solution.

Tutorial 7 The result of applying software constraints

Soft constraints, at least one weekend holiday(SatSunOff), and two consecutive holidays after Night Shifts if possible are shown. (The results depends on your PC's performance.)

Solutions

Solution1

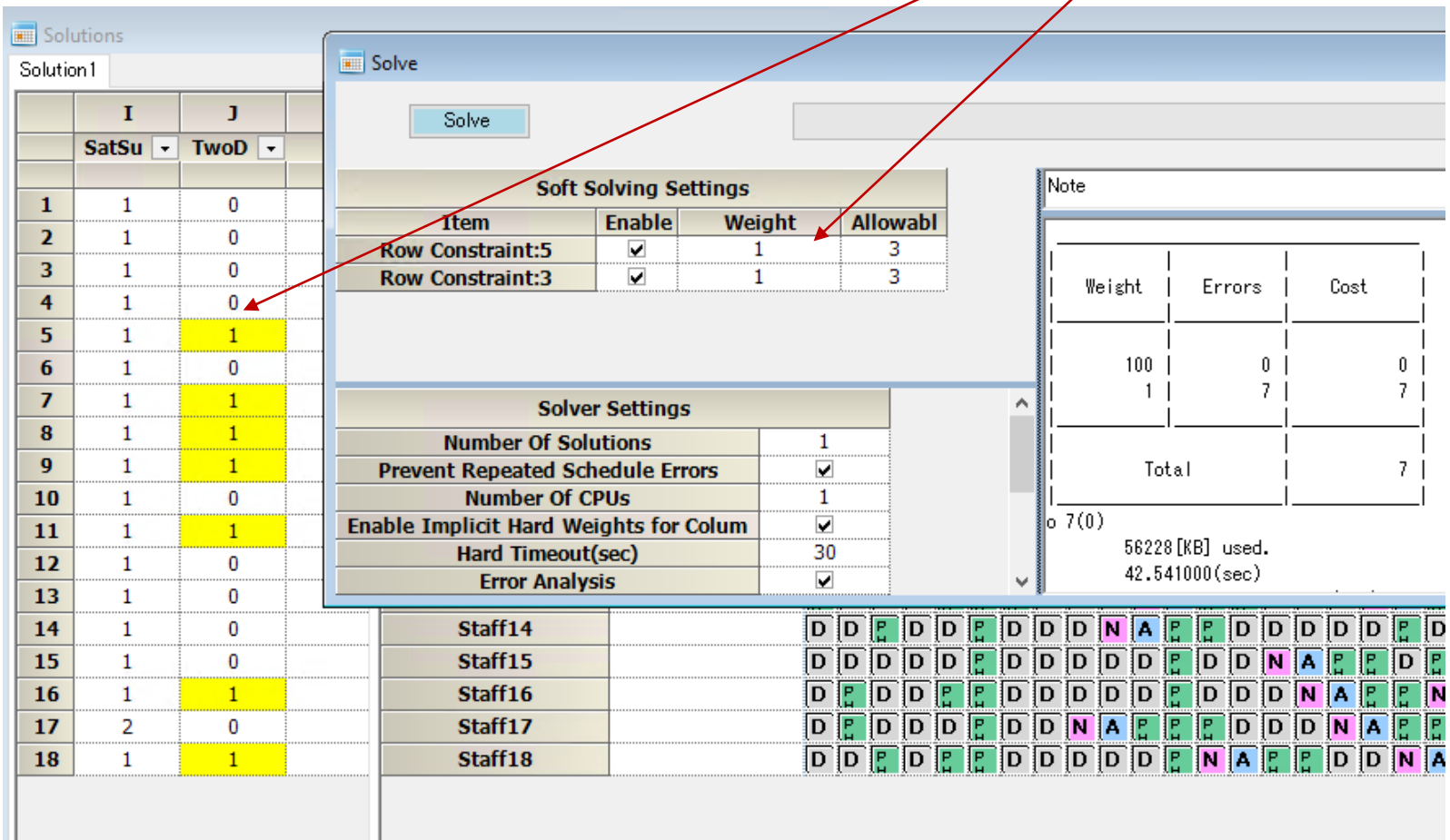
	I	J
	SatSunOff	TwoDaysOffafte
1	1	0
2	2	0
3	1	0
4	1	0
5	1	0
6	1	0
7	1	0
8	1	0
9	1	0
10	2	0
11	1	0
12	1	0
13	1	0
14	1	0
15	1	0
16	1	0
17	1	0
18	1	0

Staff Name	Filter	Previous Month					ThelWeek							The2Week								
		27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	1
		Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mo
Staff1		P	A	A	A	N	A	P	P	D	D	D	P	P	D	D	D	D	D	P	D	D
Staff2		A	A	A	P	P	D	D	D	N	A	P	P	N	A	P	P	D	D	D	P	D
Staff3		A	A	A	P	N	A	P	P	D	D	D	D	P	D	D	D	D	D	P	D	N
Staff4		A	A	D	P	P	D	P	D	D	D	D	D	P	D	D	D	N	A	P	P	D
Staff5		A	D	D	A	P	P	D	D	N	A	P	P	D	D	D	N	A	P	P	D	D
Staff6		P	A	P	A	D	D	N	A	P	P	N	A	P	P	D	D	D	D	D	P	D
Staff7		A	D	D	A	P	P	D	D	D	D	D	P	D	D	D	N	A	P	P	N	A
Staff8		D	P	D	D	D	N	A	P	P	D	D	D	P	D	N	A	P	P	D	P	D
Staff9		A	D	D	D	P	P	D	D	D	D	D	P	D	N	A	P	P	D	D	P	D
Staff10		D	D	A	D	P	P	D	D	D	N	A	P	P	D	D	D	D	D	P	N	A
Staff11		D	D	P	D	D	D	N	A	P	P	D	N	A	P	P	D	D	N	A	P	P
Staff12		D	D	D	D	P	P	D	N	A	P	P	N	A	P	P	D	D	D	N	A	P
Staff13		D	D	P	D	D	N	A	P	P	D	N	A	P	P	D	D	D	D	P	P	D
Staff14		D	D	D	D	P	D	D	N	A	P	P	D	D	D	N	A	P	P	D	D	D
Staff15		D	A	D	D	P	P	D	D	D	D	D	P	D	N	A	P	P	N	A	P	P
Staff16		D	A	D	P	D	D	P	D	D	D	D	D	P	D	D	D	N	A	P	P	D
Staff17		D	D	A	D	D	P	D	D	D	N	A	P	P	D	D	D	D	D	P	D	N
Staff18		D	D	D	D	P	P	D	D	D	D	D	P	N	A	P	P	D	D	N	A	P

	Column Constraint	Filter	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	M
1	TwoNightShift							2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
2	TwoAfterNightShift							2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3	At_least_1_nurse_per_Night_Shift							1	2	1	2	1	1	2	1	1	1	2	1	1	1	2	1
4	At_least_1_nurse_per_After_Night_Shift							2	1	2	1	2	1	1	2	1	1	1	2	1	1	1	2
5	At_least_10_persons_on_Days_on_Open		10	10	10	10			10	10	10	10	10			10	10	10	10	10			1
6	At_least_5_persons_on_Days_on_Closed						6	6						5	5						5	5	
7																							

Tutorial8 The meaning of soft constraints

You will get the following result if you find a solution. You can also see violated portions in yellow marking for the soft constraint. You can set the weight for each level. The larger the value, the higher priority. For example, if the weight is set to 10, its importance is increased tenfold compared to 1.



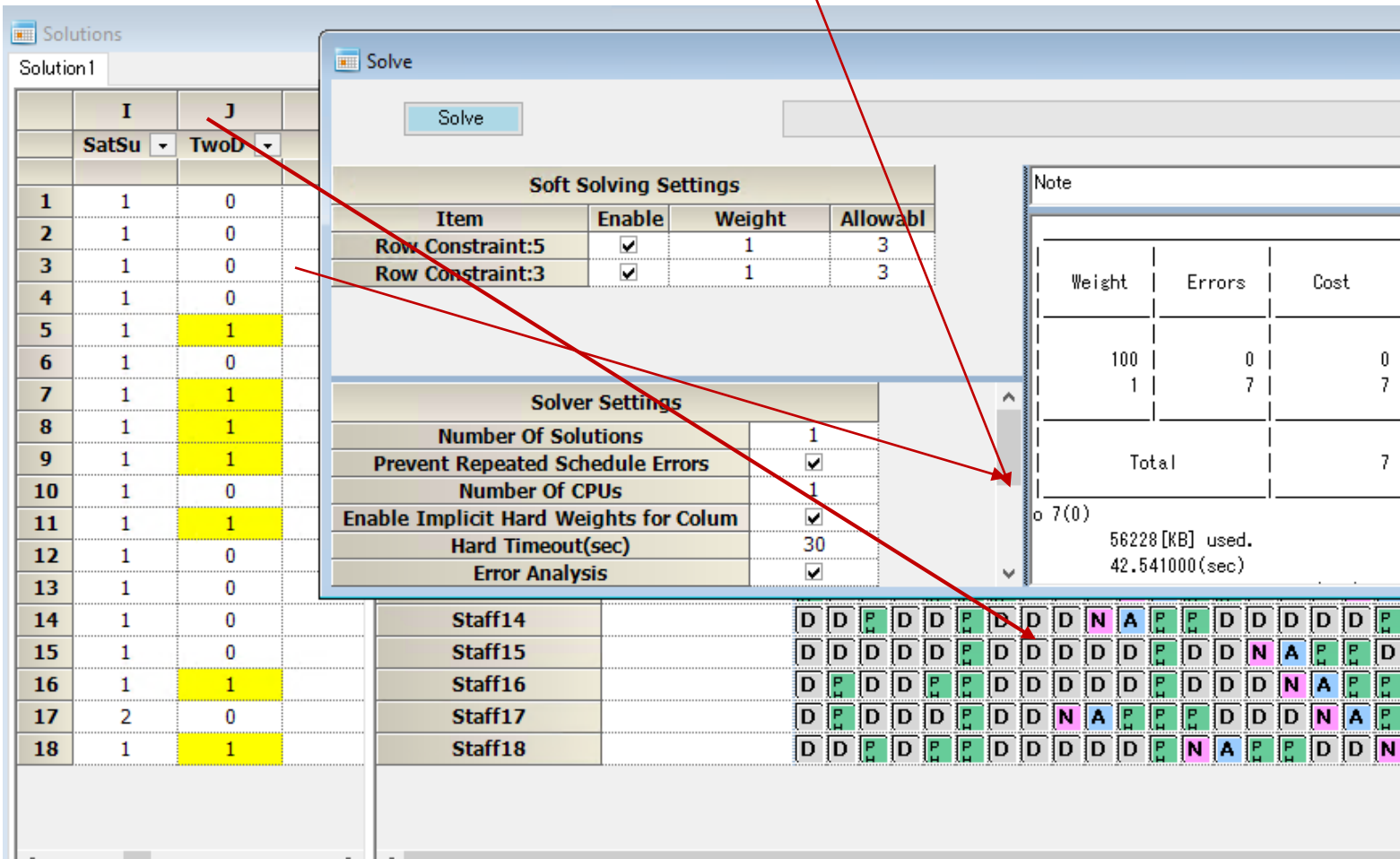
Tutorial8 The meaning of soft constraints 2

- Constraints that are not soft are called hard constraints.
- Almost all the constraints can become soft if desired.
- All hard constraints must be all satisfactory, which means that no violations are allowed in them. Otherwise, we have no feasible solution.
- The best scenario is to mix hard and soft constraints with some ratio, to get a feasible solution while getting rational solving speed.
- We have many actual samples in the Gallery. Please refer to them on how to describe hard and soft constraints.

What is the difference between Tutorial 7-8?

Find a solution and open the solution page. There are seven soft errors (soft constraints not being met) marked in yellow (this may vary slightly depending on the environment).

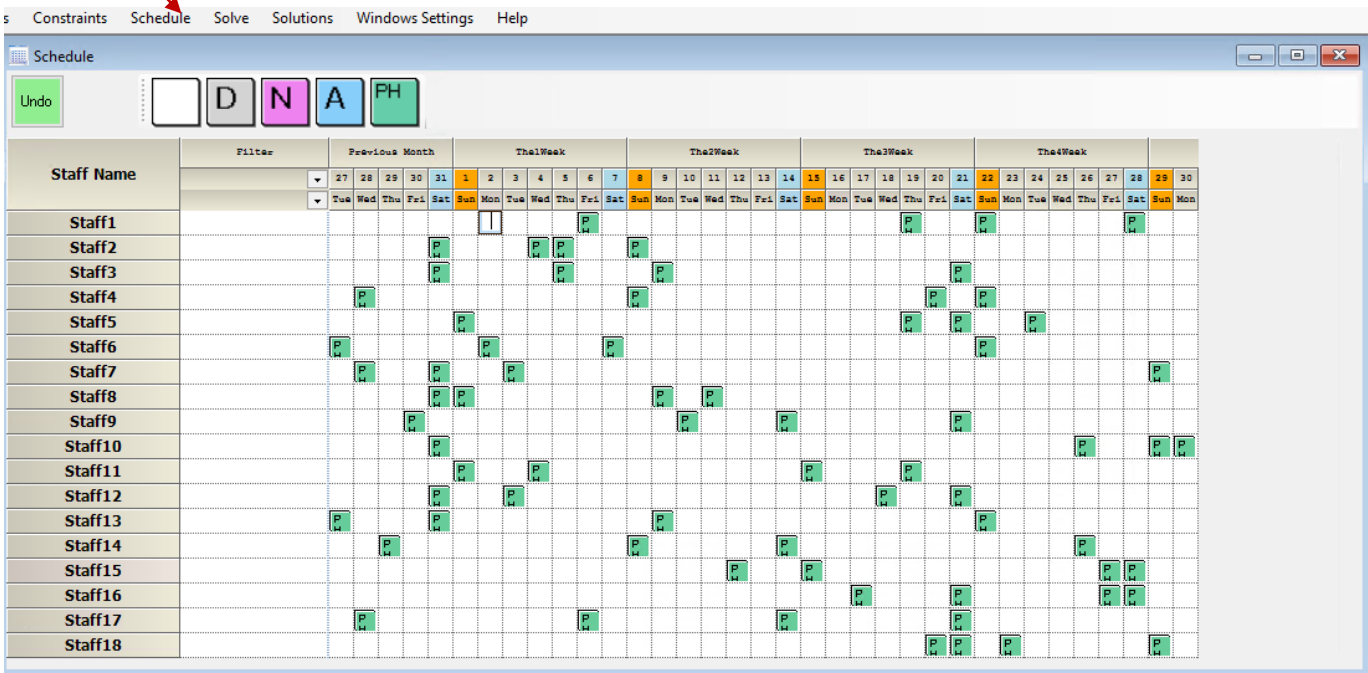
The column and row constraints are the same as in Tutorial 7, with 0/1 errors. Where did this difference come?



Tutorial 8

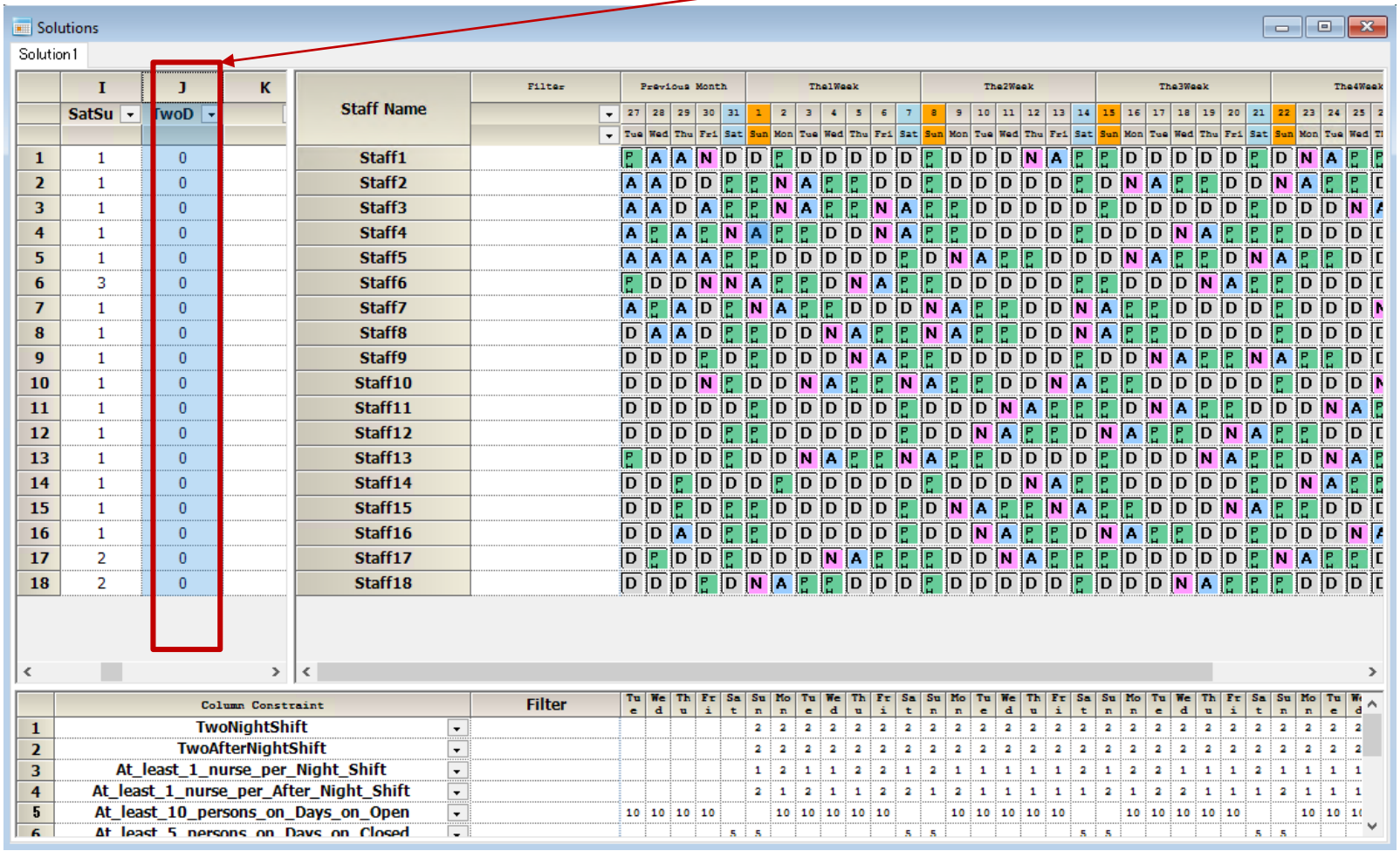
Open "Schedules." Because of the scheduling constraints, there were some cases other condition couldn't be met (no schedules were in place in Tutorial 7).

Refer to the user manual for details on how to enter schedules.



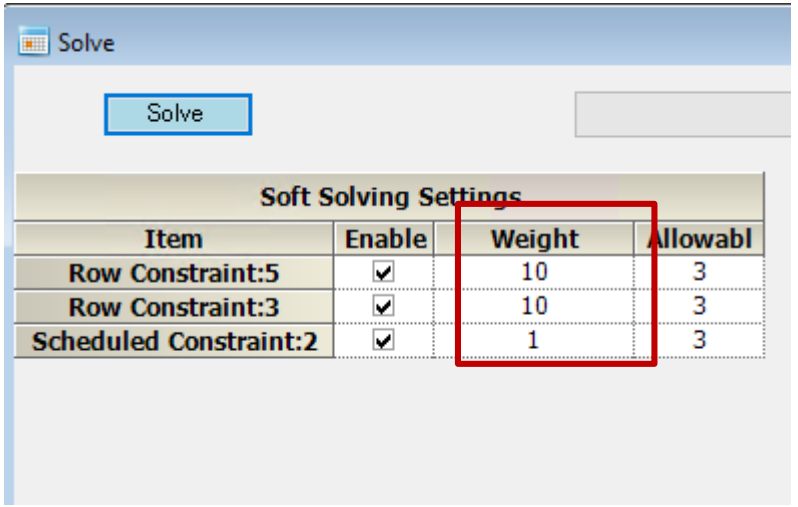
Tutorial 9

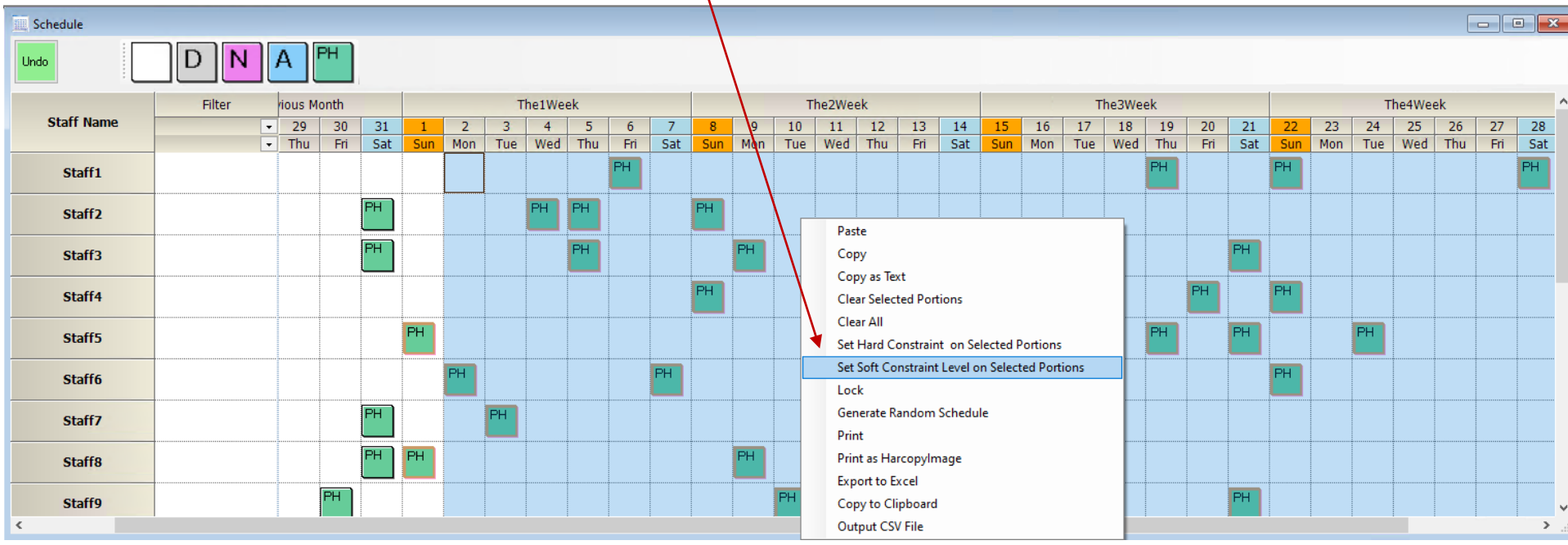
Find a solution and look at the solution. In Tutorial 8, We have some soft errors indicated by yellow marking, but this time, it seems we have no violations here even though we applied the same constraint. What is the difference between tutorial 8-9?



Tutorial Softening schedule constraints

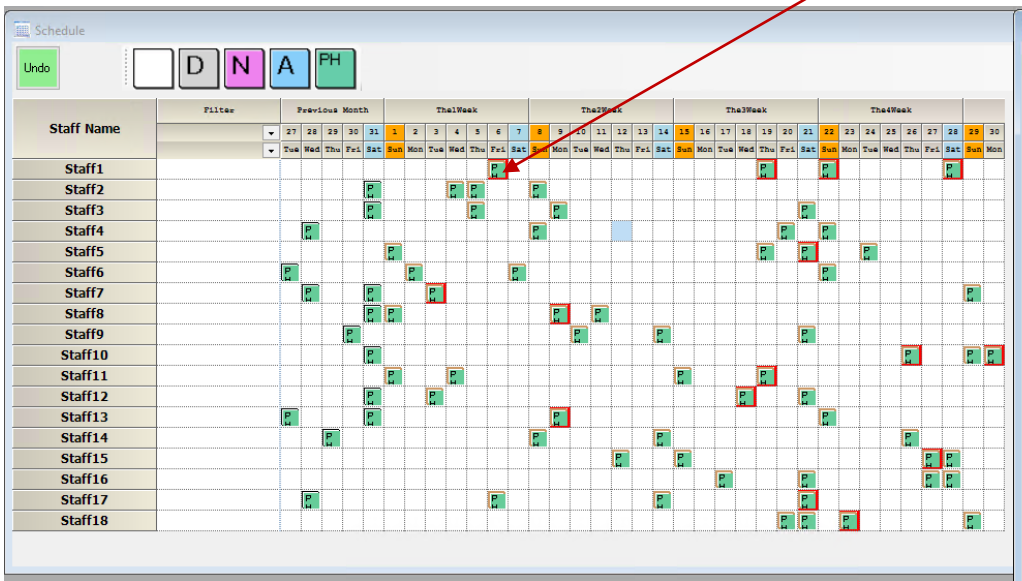
Actually, in Tutorial 9, we softened the schedule to a weight of 1, and all other values remained on 10.

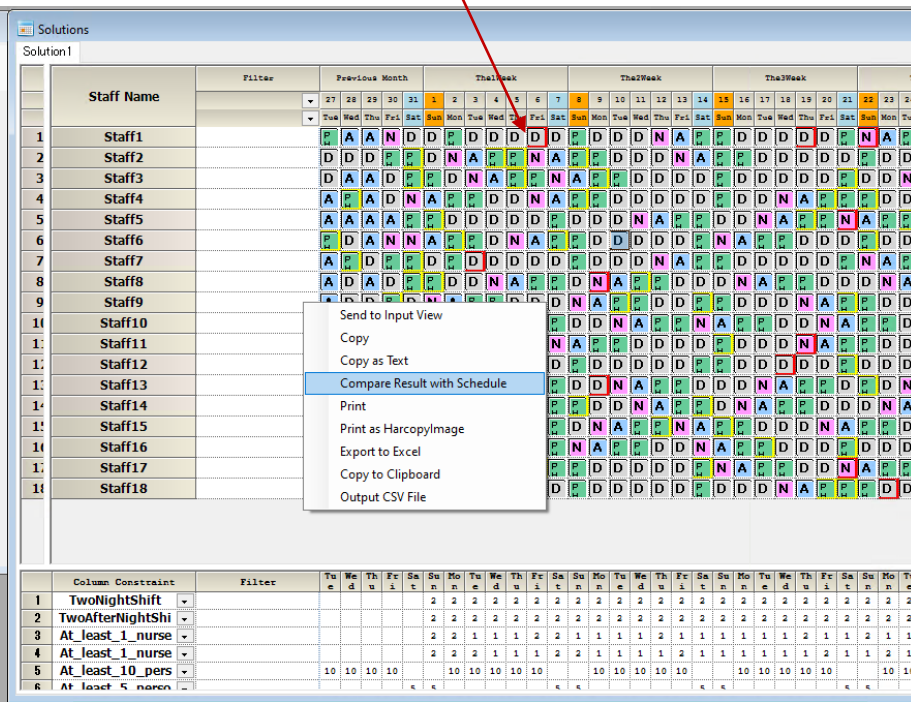




Tutorial9 Comparison Result with schedule

The difference between tutorial 8-9 is soft and hard schedules. In tutorial9, we have softened the schedule to level2 at weight 1, which is a weaker value than the other constraints. As a result, the solver changed it from the original. You can see the changed portions as red square markings.





Tutorial9 Summary 1

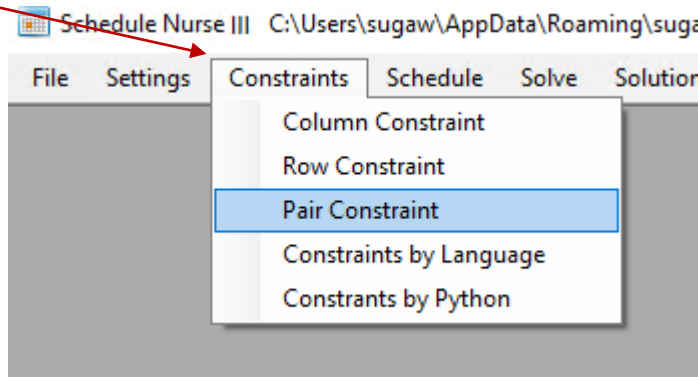
- You can soften the schedule by every day and the staff with 1-7 level at any weight.
- You can get the desired result by adjusting the weights of soft constraints. This process is optimization itself, minimizing the sum of values.
- The role of the solver is to find assignments minimizing the objective value. However, please note the solver does not know what is crucial for you. So, determining the weight of the constraint is your job.
- As a conclusion, the computer considers the minimum possible amount of the sum to be optimal. The user's role is to adjust the weights so that the computer's and the user's ideas of what's an optimal match.

Tutorial9 Summary 2

- We, as humans, tend to constrain things overly. If you take everything to be a hard constraint, there will usually be no solution. Therefore, we need to properly weave in some soft constraints to get to the solution.
- We all often experience not being able to please everyone. There is called a trade-off, where one thing increases and another must decrease. If we take one thing, we must discard another in limited human resouces. Please note that what you think is essential and trivial is entirely up to you, using hard and soft constraints with arbitrary weight.

Tutorial10

Find a solution. Open Constraints → Pair Constraints. Just enter the pair prohibitions as is. Below, night shifts between staff members 1 to 2-5 are prohibited.



Pair Constraint

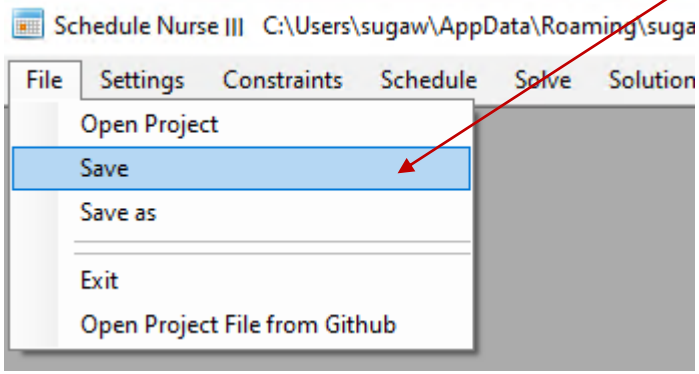
PairConstraintGroup1 | PairConstraintGroup2

Enable | Set | PairConstraintGroup1

No.	Enable	Pair Constraint Name	Constraint Type	A				B			
				Staff Definition	Operator	Shift Type	Day Type	Staff Definition	Operator	Shift Type	Day Offset
1	☑	Prohibit_Staff1-2_Nishift_Shift_	Pair_Inhibited	Staff1	OR	Night_Shift	ThisMonth	Staff2	OR	Night_Shift	
2	☑	Prohibit_Staff1-3_Nishift_Shift_	Pair_Inhibited	Staff1	OR	Night_Shift	ThisMonth	Staff3	OR	Night_Shift	
3	☑	Prohibit_Staff1-4_Nishift_Shift_	Pair_Inhibited	Staff1	OR	Night_Shift	ThisMonth	Staff4	OR	Night_Shift	
4	☑	Prohibit_Staff1-5_Nishift_Shift_	Pair_Inhibited	Staff1	OR	Night_Shift	ThisMonth	Staff5	OR	Night_Shift	

Saving a project

- Click File → Save to save a project.
- In some cases, you may want to revert to the earlier settings, so you can save it as a different version with the option "Save As."



Transitioning to the next month

- A project consists of the following three dates.

- StartDate

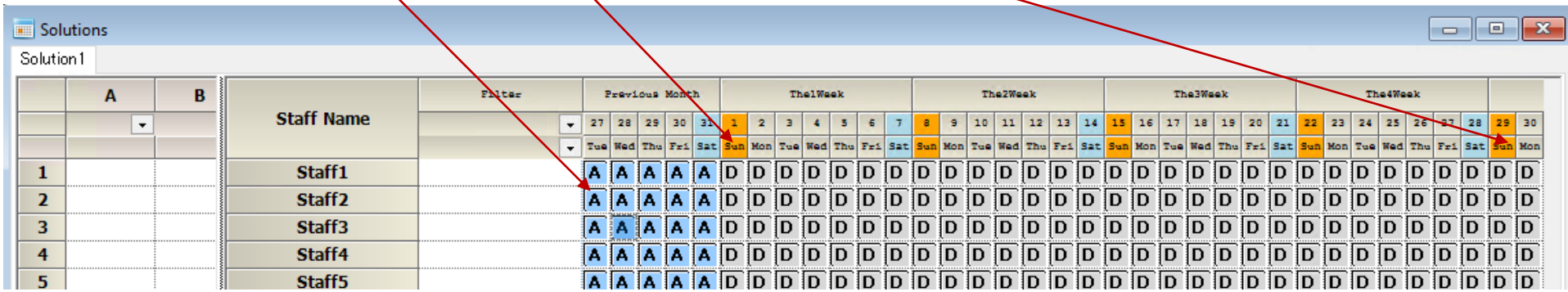
This marks the beginning of the month. It doesn't necessarily have to be the first day of the month.

- FinshDate

This marks the end of the month. It doesn't necessarily have to be the last day of the month.

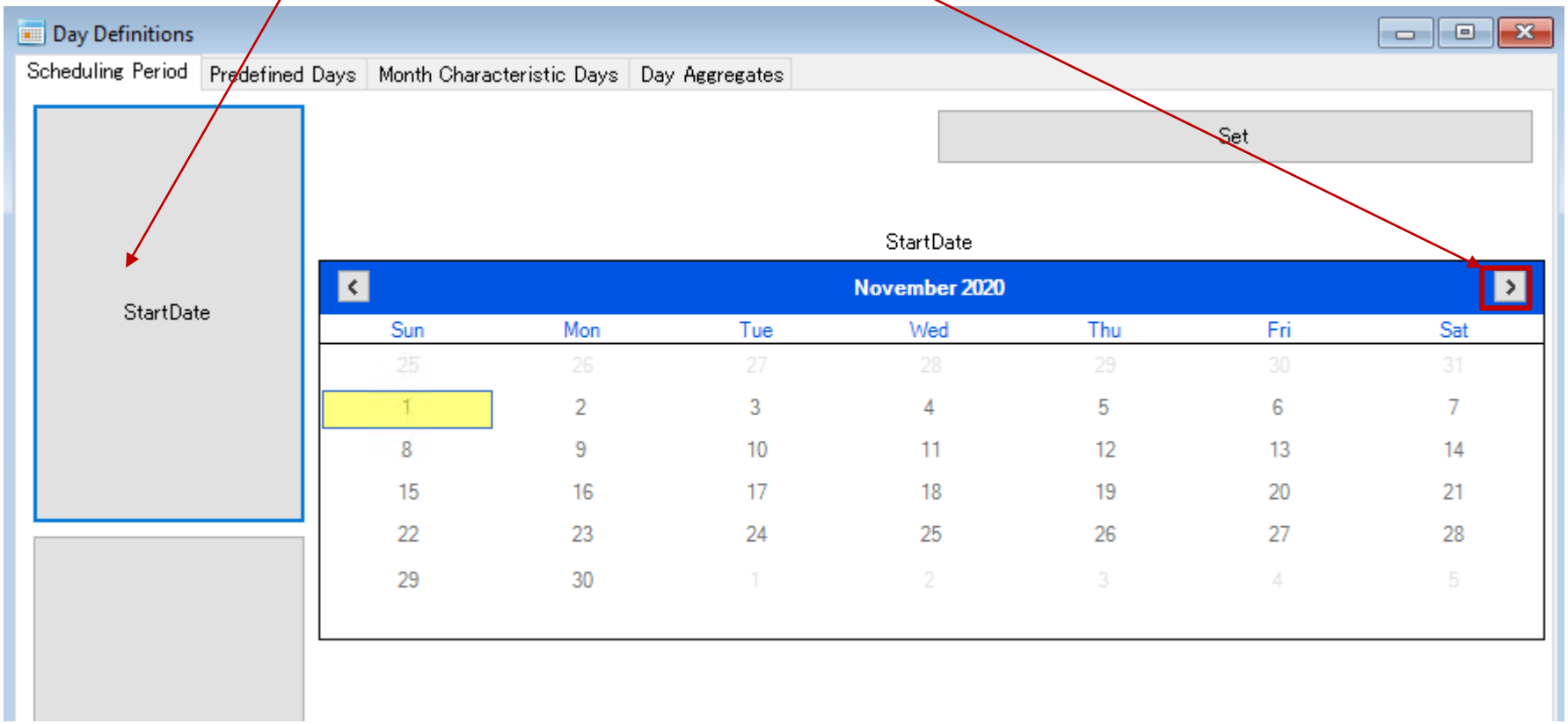
- StartDisplayDate

Indicates the start date of the display.



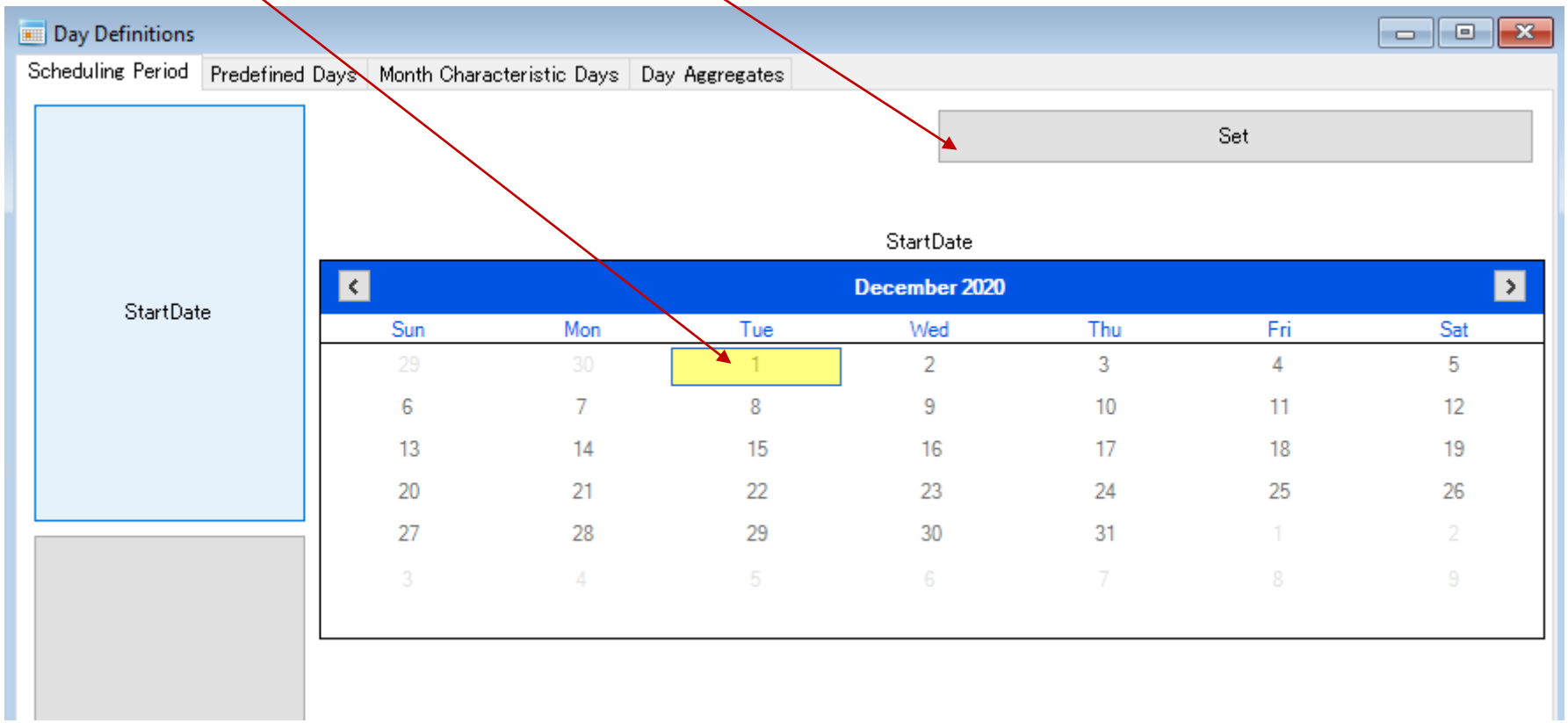
Transitioning to the next month 2

Let's try to do it with Tutorial 10. Click Settings → Date Definitions → Scheduling Period → Start Date. Click here to go to the next month.



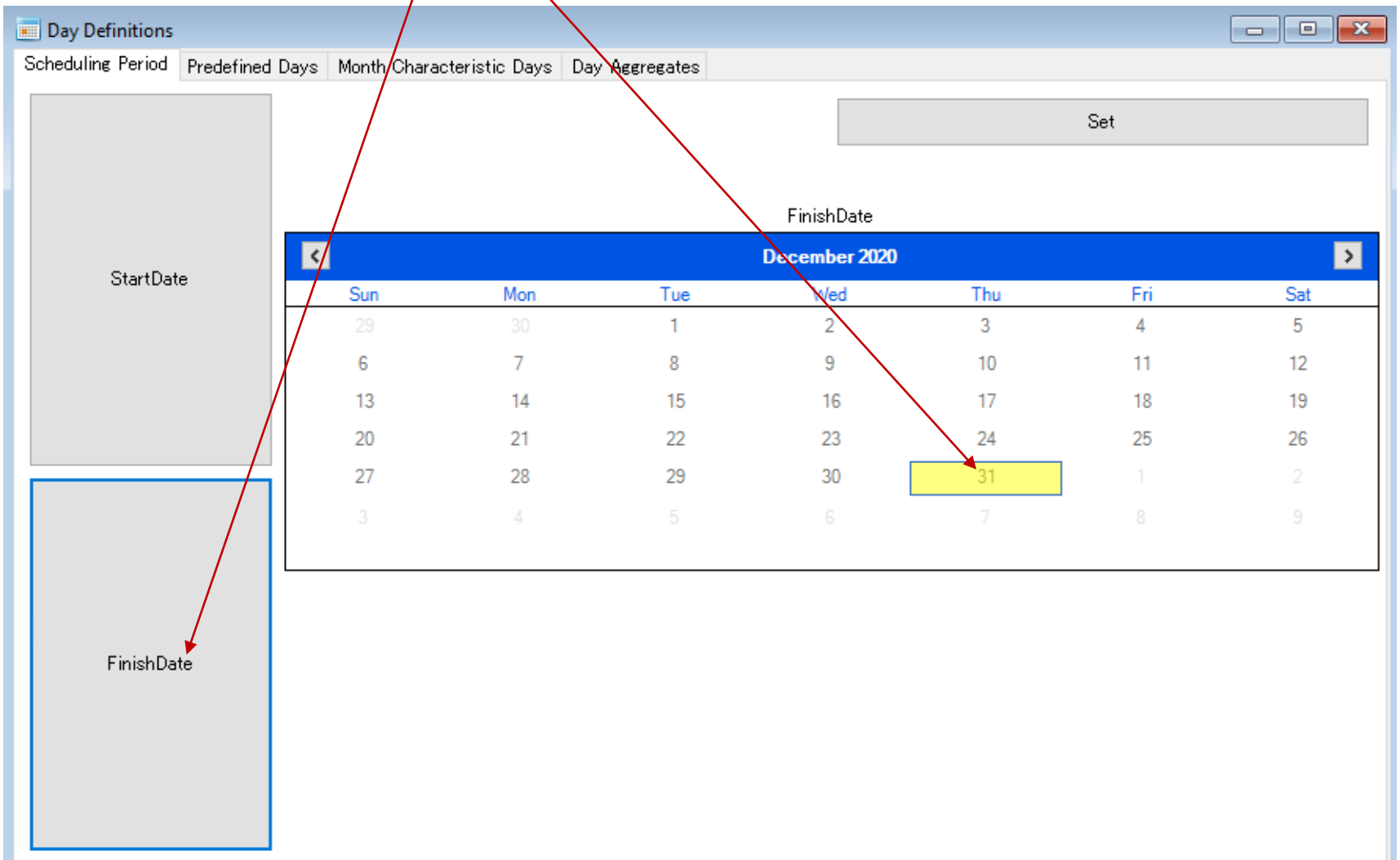
Transitioning to the next month 3

Click 1 and then click the Set button. This sets the Start Date.



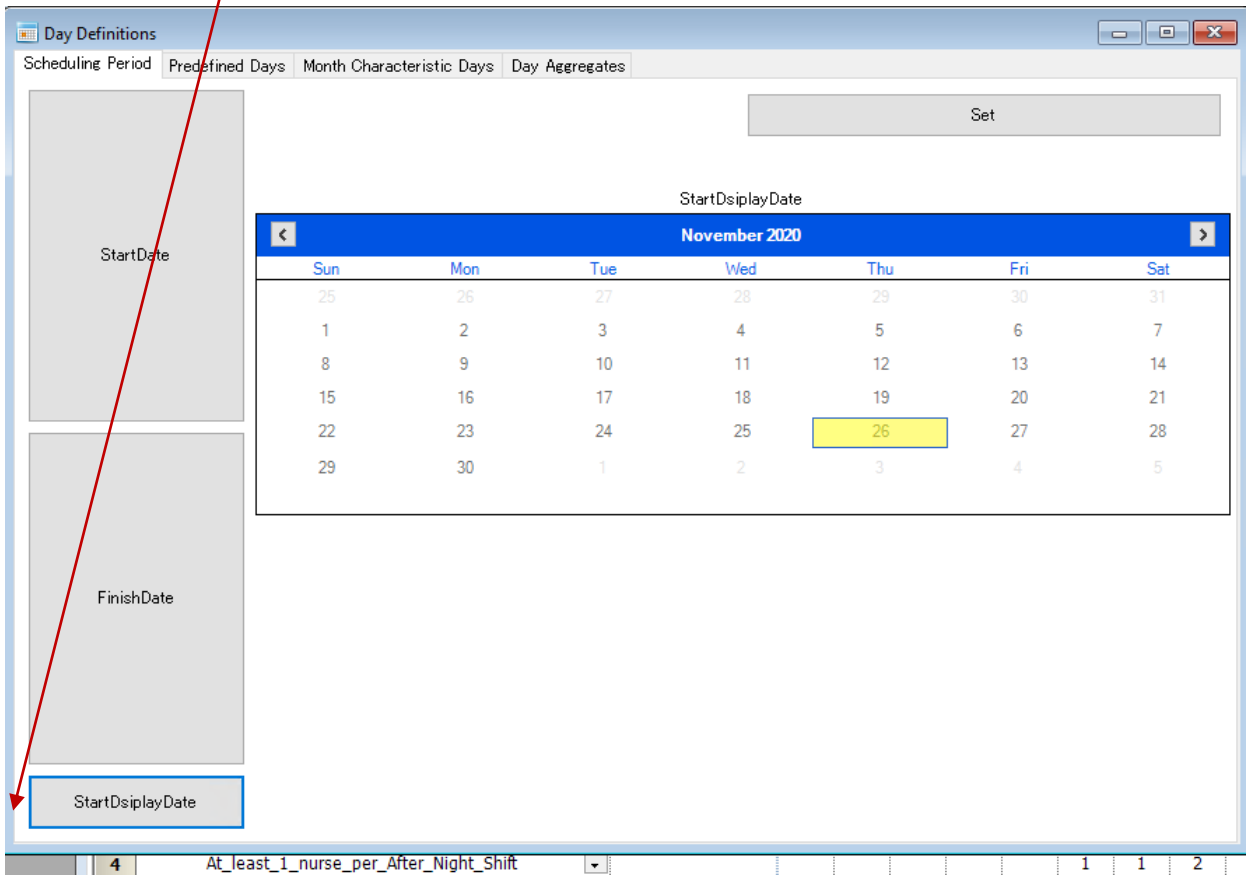
Transitioning to the next month 4

Click on FinishDate, click 31, and then click the Set button. This sets FinishDate.



Transitioning to the next month 5

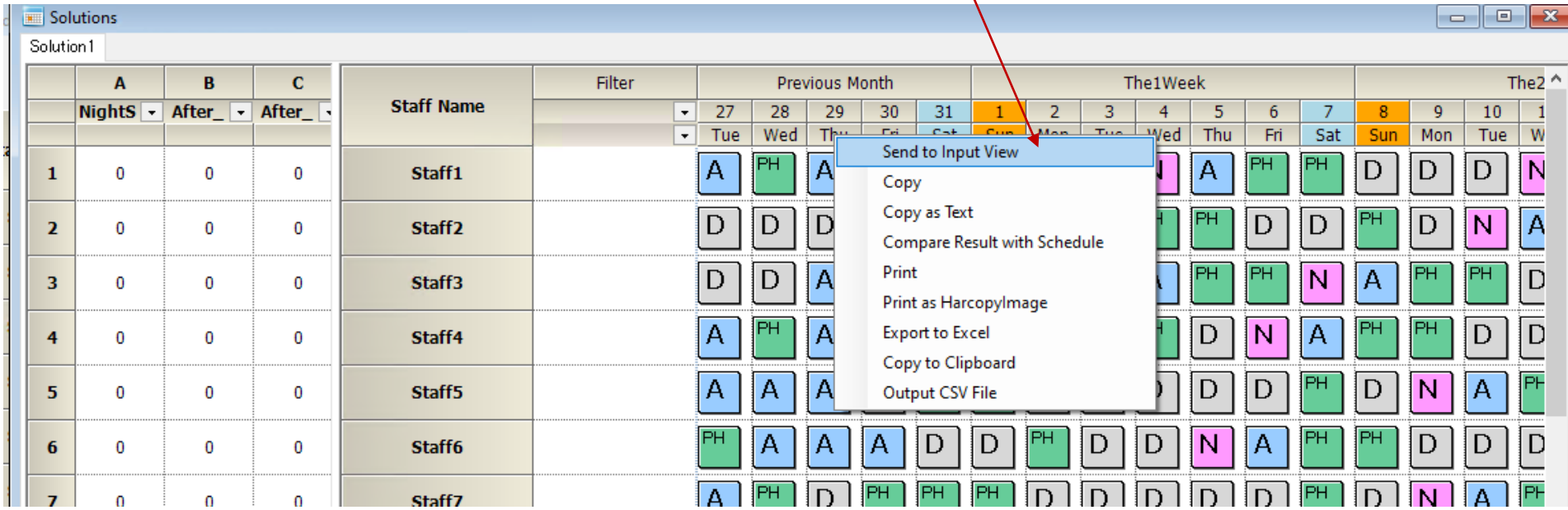
Click on StartDisplayDate, click on the 26th of the previous month, and then click on the Set button. This sets the display start date.



Click on the StartDate, FinishDate, and StartDisplayDate to make sure that they are all set up correctly.

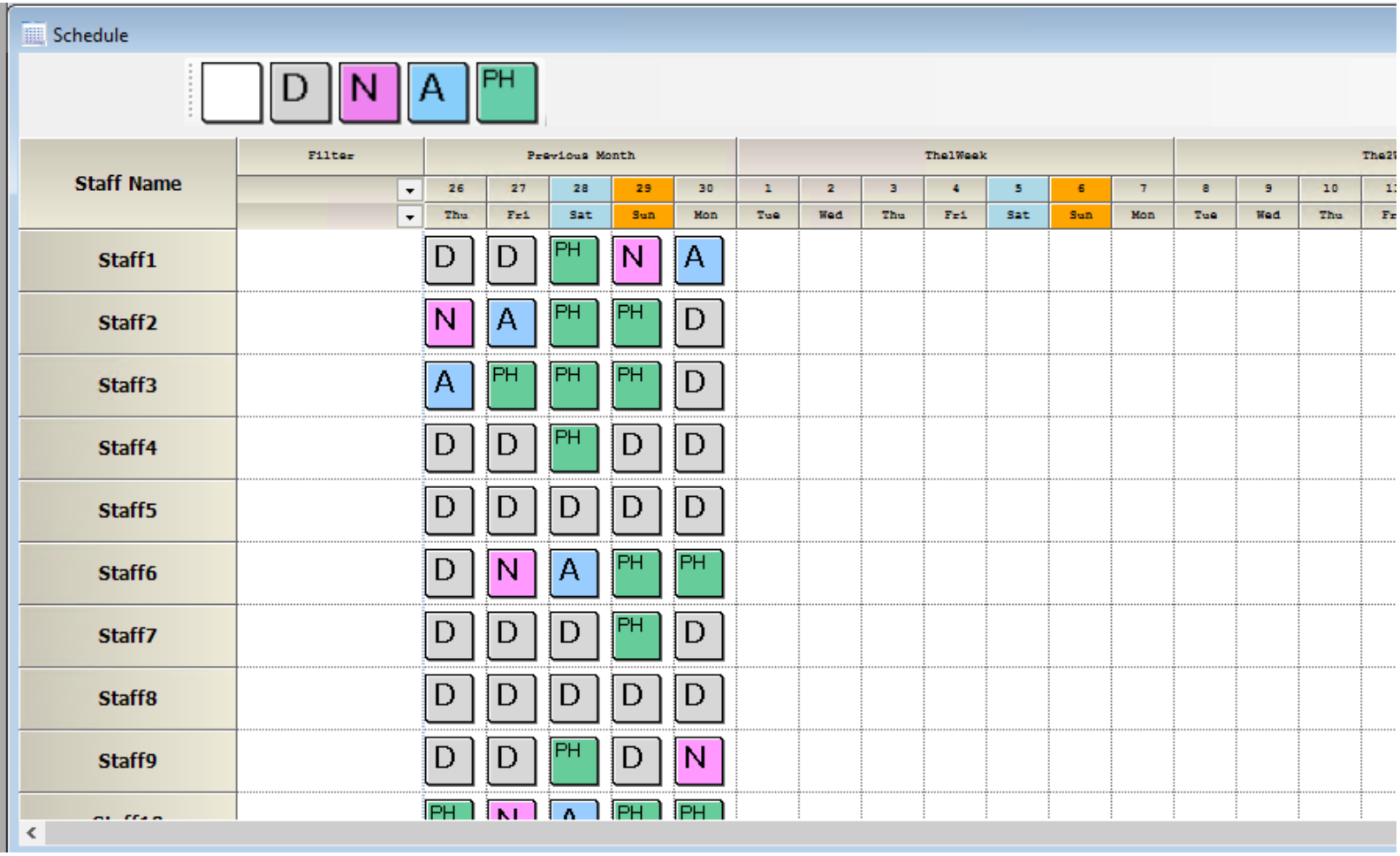
Transitioning to the next month 6

Click on the solution and then click Send to Input View. This will send the solution to the schedule.



Transitioning to the next month 7

Open the schedule and check it. By saving the project with Save or Save As, the project for this month is complete.
After adding work and vacation requests, find a solution for the next month's project.



Tutorial summary

- Congratulations! You now know the outlines of this program.

- The standard form for two shifts is Tutorial9. It's a good idea to use this as the base and then make changes an additions depending on the customer's specifications.

Glossary

Solver	The software equivalent of a brain which solves a problem.
Constraint	A work rule
Solution	An answer which satisfies the constraints
Hard constraint	A constraint that must be satisfied
Soft constraint	A constraint that should be satisfied if possible
Optimization	Minimizing the sum of weights times the number of errors by reducing the number of errors one at a time
Resource	Human resources.
Row	A horizontal line
Column	A vertical line
Satisfying	Satisfying a constraint
Error	Failure. Mistake (deviation from a target, a penalty)
Bottleneck	A state where there is no solution due to the difficulty of satisfying the constraints
Trade-off	A relationship in which you have to sacrifice something else in order to achieve something.

Glossary 2

Project file	A customer-specific configuration file containing constraint, schedule entries and solutions. It is usually created with a different name for each month.
Company SE	Our system engineer
Hard error	The absence of a solution (the error that the solver shows when it finds a contradiction)
Solution1	The first answer. Solution2 is the second answer.
Soft error	Where soft constraints cannot be satisfied.
Optimizing	Minimizing the soft errors, including the weights
Conflict	Contradictions between hard constraints. A state in which there is no solution that satisfies both at the same time
Over-constraining	A state in which there are too many constraints and it is difficult to find a solution which satisfies all of them at the same time.