Scheduling-123

I have a staff of 100 and 4 restaurants that operate daily. I need to figure who is going to work at each restaurant, on each shift, and in what role since many of my staff can perform multiple duties in my restaurants. I need a schedule for each day for the next 6 months so I can let everyone know when and where they'll be working. I want to respect everyone's wishes with respect to scheduling restrictions as much as possible because I know many of my staff have vacations scheduled or they have personal situations preventing them from working at some of my locations or work shifts.

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What is this tool and what features does it have?

This is a tool that does generalized scheduling. It can schedule any set of people or things, in any context, to be at a certain location, at a certain time, fulfilling a certain purpose. It uses a who, what, where, when, and why paradigm to define this. For purposes of easy readability, this document will assume the context is a Small Business, scheduling Employees to be working at various Office/Locs, during various Shifts, fulfilling various Roles. These are indeed the default values in the tool for context, who, what, where, when, and why. Keep your mind open as you read about this tool for uses in other contexts.
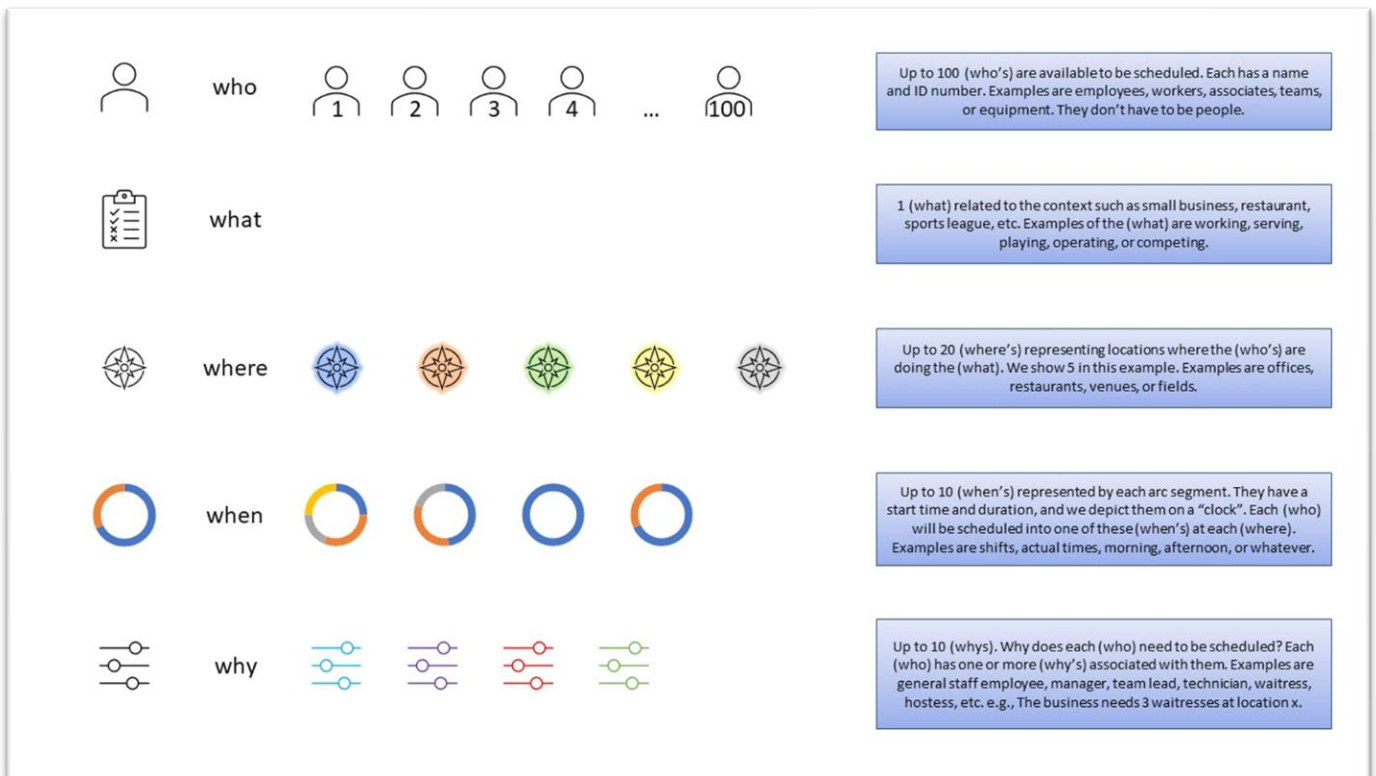
With that background, this tool creates an assignment schedule for all your employees over any date span. What is an assignment schedule? Essentially who should show up where and when.

In more technical terms, we are filling multiple work slots with the right people. Work slots are the association of a (date), (where), (when), and (why). In our default context, which person is scheduled to be at a specific Office/Loc, on a certain Shift, filling a particular Role, on a required date. This is repeated for every date, office, shift, and role across the span of dates comprising the schedule. A schedule could be filling hundreds of work slots.

Help me visualize the scheduling

Step 1 and Step 2 – Define the (where's) and (when's)

Step 1 is to define your (where's) or locations. Places where the (what) takes place and where the (who's) will be scheduled.

Step 2 is to match the (when's) to each (where). How many start times and durations exist at each (where).

In the small business context, you will have employees scheduled to be at various offices during various shifts.

Step 3 – Define the (why's) and the association of (where/when/why) for your operation

Step 3 is to define what mix of (whys) and how many of each are required at each (where) during each (when). e.g., How many staff, managers, and technicians are needed on 1st shift vs 2nd shift at the Main office versus the Spring St. office. Repeat for each (where/when) pair you defined. In this example we filled in a few locations, but each (where/when) pairing would have its own set of (why's). We call the combination of each (where/when/why) a work slot, and it will be the job of this tool to fill each work slot with an appropriate person.
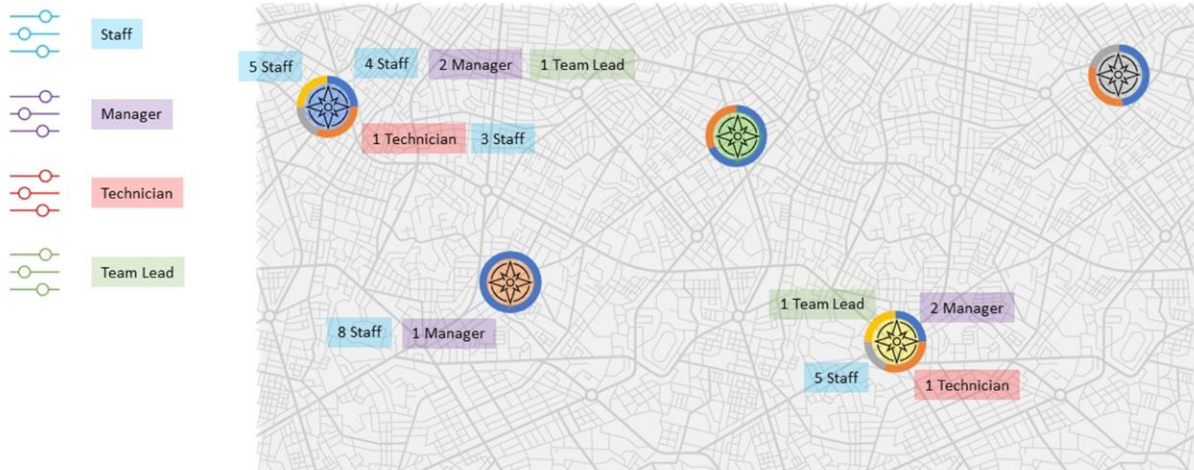
Step 4 – Associate each (who) to a (why) (e.g., what role does each person have)

Step 4 is to record which (whys) each (who) has. In the small business context, the (who's) are employees and the (why's) are job roles. So, we need to know which employees by name have the job role Manager, Technician, Team Lead, or general Staff. Some employees can fulfill multiple job roles.
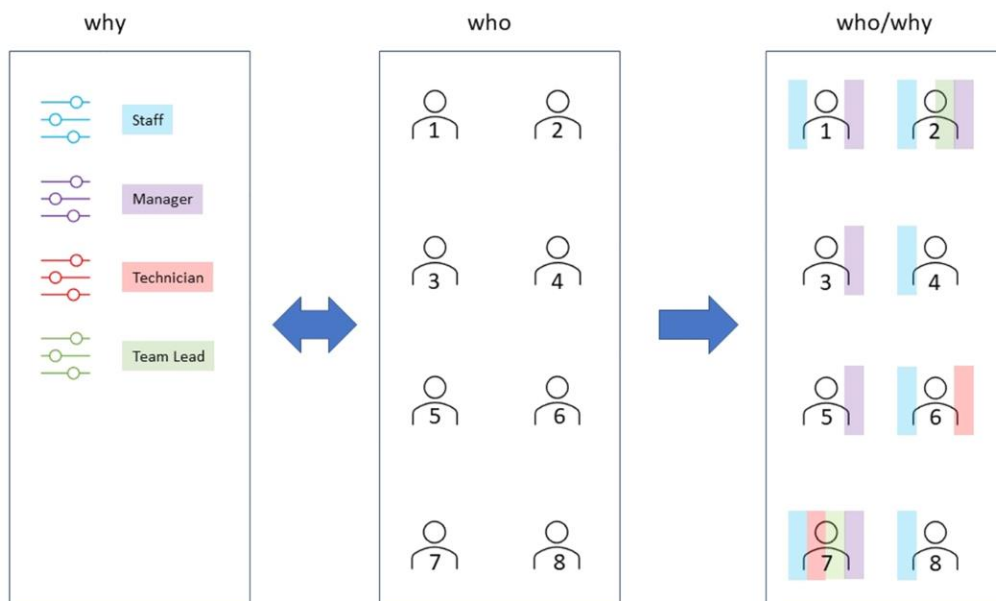
Step 5 – Record any scheduling restrictions for each (who)

Step 5 is to define which people have scheduling restrictions like only being able to work in certain locations or times or never working in certain locations or times. Ditto for dates or days of the week to avoid vacations and personal hardships.

who

Employee 2 can't work at this grey office.

Employee 3 can't work at this blue office.

Employee 4 can only work at this yellow office.

Employee 5 can't work on either the orange or blue shifts, nor can they work in the green office..

Employee 6 can only work on this blue shift.

Step 6 – The magic! How this tool creates a schedule

Step 6 is where the Scheduling-123 tool steps in. It matches an appropriate person with each work slot you defined. Example, who by name should we schedule to be at the green office during the blue shift to work in the technician role. We chose #6 in this example because they have the technician role and can only work on a blue shift. Several of the 8 people are depicted with scheduling restrictions and therefore cannot be used to fill certain work slots.

In this example there are many people required to be able to schedule all the depicted work slots. We are only showing 8 people scheduled so far, but the more work slots that are required the more people you will need on staff from which to draw.

My Staff of 100

5 Staff   4 Staff   1 Team Lead

1 Technician

1 Manager

3 Staff   1 Technician

3 Staff

1 Team Lead

2 Manager

5 Staff

2 Manager

1 Manager   8 Staff

1 Technician
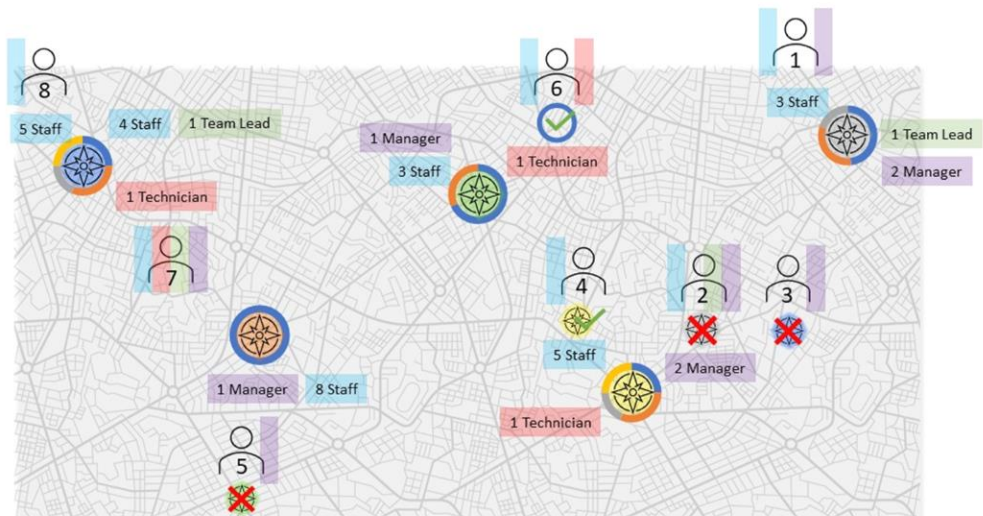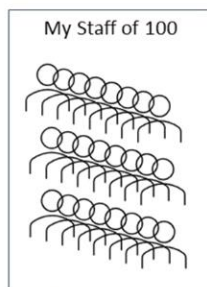
Remember, the real schedule is this picture repeated every day (or every week).

How do I get the tool and its latest version?
This is version 1.3 dated 6/1/2021

This tool was written by Bill Hladik and it uses Excel version "Microsoft 365" with recently added formulas and dynamic arrays. You do not need to understand Excel to any depth to use the tool.

- If you <u>do not</u> have Excel version Microsoft 365 installed, you will have to use this tool from the online version of Excel (which is free to use) from here:
    - https://wjhladik.github.io/scheduling-123.html

    Take note that the online version is not fully functional. You can change inputs and options and it will regenerate the schedule, but you cannot save anything nor export any data. It's meant as a way for you to take a quick look at the tool.

- If you <u>do</u> have Excel version Microsoft 365 installed, you can download it from here:
    - https://wjhladik.github.io/scheduling-123.zip
- which will include the scheduling-123.xlsx tool and the scheduling-123.pdf documentation.
- The documentation is also available for direct online viewing from here:
    - https://wjhladik.github.io/scheduling-123.pdf
- You can also view an online Sway introduction to the tool from here:
    - https://sway.office.com/78P4vbWu7YMMwG7d?ref=Link

Scheduling-123 Overview
Schedule Features
- The schedule can extend out in time for 1 year (a soft limit for performance reasons).
- Employees can be scheduled by the day or by the week (365 daily work schedules or 52 weekly work schedules).
- Any day or days of the week can be skipped (not scheduled) – perfect for excluding weekends when your business is not open.
- A list of holidays can be recorded when your business is not open and when no employees will be scheduled to work.

Work Slot Features
- Employees can be scheduled to work in up to 20 different office/locations and shifts/start times. For example, the Main office can be scheduled for 1st and 2nd shift, while the Spring St. office should only be scheduled for 3rd shift.
- You can define up to 10 shifts (or start times and durations). E.g., the normal 1st, 2nd, and 3rd shifts lasting 8 hrs each or perhaps half shifts of 4 hr durations. Whatever your business operates on.
- Each of the up to 20 office/location & shifts can have up to 10 self-defined roles working in them. For example, the Main office on 1st shift might require 8 general Staff employees and 2 Managers or supervisors, while the 3rd shift Spring St. office only needs 3 Staff employees, 1 Team Lead, and 1 Maintenance Tech role.

Employee Related Features

- Each employee can have their own personal scheduling restrictions recorded and the tool will consider those when finding employees to fill each work slot in the schedule. Examples are:
    - Not working on specific days of the week or only working on specific days of the week.
    - Not working on specific dates or date ranges because of vacation or holiday.
    - Not working in specific Office/Locations or only working in specific Office/Locations.
    - Not working on specific shifts or only working on specific shifts.
- Each employee can be tagged with a single or with multiple roles making them available to fill various work slots in the schedule (if their personal scheduling restrictions allow it). Employees with no tagged role become general Staff and may fill work slot roles designated as "Staff". Examples of roles your business may wish to schedule:
    - A restaurant: Staff (Wait staff), Manager, Hostess, Cook, Bus Boy
    - A medical office: Staff (receptionist), PA, Nurse, Doctor
    - A basketball team: Point Guard, Guard, Power Forward, Forward, Center

Tool Features

- Very few inputs are required to get started.
- Up to 100 employees can be scheduled (a soft limit for performance reasons).
- No employee will be scheduled twice on the same day.
- Repeat scheduling of the same employee is limited by their role and how many other employees with the same role you have. This is to spread out the scheduling amongst all employees if possible. For example, if you have a lot of employees tagged as general Staff, they will most likely only be scheduled up to 2 times until we get through scheduling all the employees with the Staff role. However, if there are only a few employees with a role of Manager or Team Lead, they might be scheduled each day and would therefore have lots of repeat schedule assignments.
- The tool contains various reports showing you the assignment schedule it calculated. You can use these to both communicate the schedule to your employees and to manage your business by understanding who is supposed to be where each day.
- It also contains exports of the schedule for import into a shared Google Calendar or a shared Microsoft Outlook Calendar. This is an easy way for all employees to know when and where they have been scheduled to work.
- The tool takes the form of a Microsoft 365 Excel spreadsheet and can either be downloaded and used locally or used online for free if you do not have Excel installed locally.
- You can "Lock in" or override the schedule if you wish. There is a mechanism to lock in all or part of the calculated schedule to perhaps preserve already communicated work dates or to force key employees to be scheduled into specific work slots.

Here is an example of one report the tool produces:

Total Assignments --->	11	8	18	15	48	24	10	6	25	48	34	27	24	48	20	22	0	29	2	29	0	4	30	0	17	27	28
	Audrey Hepburn	Ava Gardner	Barbara Stanwyck	Bette Davis	Burt Lancaster	Buster Keaton	Carole Lombard	Cary Grant	Charlie Chaplin	Clark Gable	Claudette Colbert	Edward G. Robinson	Elizabeth Taylor	Fred Astaire	Gary Cooper	Gene Kelly	Ginger Rogers	Grace Kelly	Gregory Peck	Greta Garbo	Henry Fonda	Humphrey Bogart	Ingrid Bergman	James Cagney	James Dean	James Stewart	Jean Harlow
Weekday / Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Tuesday 6/1/2021		IW			S				S	S	S		S							XD		IW	S				
Wednesday 6/2/2021		IW		S	S	XW			S	S			S	S													
Thursday 6/3/2021	S	IW	S		S				S	S	S	S	S	S	XW	S		S		S		IW	S		S	S	S
Friday 6/4/2021															XW					S		IW	S		S	S	S
Monday 6/7/2021	XW			S	S	XD			S	S			S	S	S			S				IW					
Tuesday 6/8/2021	S	IW			S	S			S	S	S		S					S		S		IW	S		S		
Wednesday 6/9/2021		IW		S	S	XW							S	S	S							IW					
Thursday 6/10/2021		IW	S		S				S	S			S		XW			S				IW					S
Friday 6/11/2021	S				S				S	S	S		S		XW							IW					
Monday 6/14/2021	XD	S		S	S				S	S	S		S	S	S							IW					
Tuesday 6/15/2021		IW			S				S	S	S	S	S	S				S				IW					
Wednesday 6/16/2021		IW				XW	S							S						S	S						
Thursday 6/17/2021		IW			S	S			S	S	S		S	S	XW	S		S				IW			S	S	S
Friday 6/18/2021	S				S	S	S		S	S	S	S	S	S	XW			S				IW					
Monday 6/21/2021	XW	S			S					S	S		S					S		S		IW	S		S		
Tuesday 6/22/2021		IW				S			S	S			S		S				S			IW					
Wednesday 6/23/2021	S	IW	S		S	XW			S													IW					
Thursday 6/24/2021		IW			S	S	S		S	S			S		XW	S						IW					
Friday 6/25/2021					S				S	S	S	S	S		XW							IW					
Monday 6/28/2021	XW	S												S	S							IW			S	S	S
Tuesday 6/29/2021		IW			S	S	S		S	S	S		S	S						XD		IW	S		S	S	S
Wednesday 6/30/2021		IW	S	XD	S	XW	S	S			S		S	S						XD			S		S		S
Thursday 7/1/2021		IW			S				S	S	S	S	S	XD	S			S		XD		IW					
Friday 7/2/2021	S					S									XW	S				XD		IW	S		S		
Tuesday 7/6/2021		IW	S						S		S	S								XD		IW					S

Figure 1: A sample portion of a work schedule for 35 employees (some having scheduling restrictions)

Jun 2021

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1 Main (s1): Edward G. Robinson,	2 Main (s1): Annette Brüls, Robert	3 Main (s1): Greta Garbo, Claudette	4 Main (s1): Shirley Temple, Jean	5
6	7 Main (s1): Robert Frist, Sidney	8 Main (s1): Buster Keaton, Greta	9 Main (s1): Robert Mitchum, Mae	10 Main (s1): Jean Harlow, Claudette	11 Main (s1): Claudette Colbert, Sundar	12
13	14 Main (s1): Ava Gardner, Bette Davis, Marlon Brando, Mae West, Ryan Smith, Eric Yuan, Charlie Chaplin, Robert Frist, Claudette Colbert, Lynn	15 Main (s1): Sundar Pichai, Spencer Tracy, Mitch Snyder, Marx Brothers, Bert Bean, John Wayne, Marlene Dietrich, Edward G. Robinson, Greta	16 Main (s1): Marilyn Monroe, Cary Grant, Gary Cooper, Ian Siegel, Shantanu Narayen, Orson Welles, Brian Halligan, Judy Garland, Rita	17 Main (s1): Laurence Olivier, Claudette Colbert, James Dean, Buster Keaton, Jean Harlow, Grace Kelly, Marx Brothers, Lillian Gish,	18 Main (s1): Shirley Temple, Marx Brothers, Buster Keaton, Claudette Colbert, Daniel Dines, Vlad Shmunis, Eric Yuan, Edward G. Robinson,	19
20	21 Main (s1): Cary Grant, Kirk Douglas, Lauren Bacall, Charlie Chaplin, Judy Garland, John Wayne, Ava Gardner, Ingrid Bergman, Grace Kelly, Lynn Jurich, Mgr:Burt Lancaster, Mgr:Clark Gable	22 Main (s1): Manny Medina, Buster Keaton, Timothy Cook, Marx Brothers, John Foley, Eric Yuan, Katharine Hepburn, Dan Rosensweig, Daniel Dines, Laurence Olivier, Mgr:Conflict, Mgr:Conflict	23 Main (s1): Judy Garland, William Holden, Annette Brüls, Katharine Hepburn, Lynn Jurich, Vlad Shmunis, Manny Medina, Kirk Douglas, Bert Bean, Brian Halligan, Mgr:Fred Astaire, Mgr:Burt Lancaster	24 Main (s1): Mary Pickford, Claudette Colbert, Katharine Hepburn, Laurence Olivier, Greta Garbo, Eric Yuan, Buster Keaton, Carole Lombard, John Foley, James Dean, Mgr:Burt Lancaster, Mgr:Clark Gable	25 Main (s1): Claudette Colbert, Edward G. Robinson, Sundar Pichai, Marlene Dietrich, Mitch Snyder, Vlad Shmunis, Patrick Pacious, Marlon Brando, Timothy Cook, Elizabeth Taylor, Mgr:Burt Lancaster, Mgr:Clark Gable	26
27	28 Main (s1): Gary Cooper, Lynn Jurich, James Dean, William Holden, Ryan Smith, Vlad Shmunis, Satya Nadella, Annette Brüls, Jean Harlow, Manny Medina, Mgr:Conflict, Mgr:Conflict	29 Main (s1): Dan Rosensweig, Laurence Olivier, Buster Keaton, Marx Brothers, Satya Nadella, Gary Cooper, James Dean, Jean Harlow, Ingrid Bergman, Carole Lombard, Mgr:Fred Astaire, Mgr:Burt Lancaster	30 Main (s1): Ingrid Bergman, James Dean, Gary Cooper, Barbara Stanwyck, Brian Halligan, John Wayne, Shantanu Narayen, Judy Garland, Henry Schuck, Cary Grant, Mgr:Burt Lancaster, Mgr:Clark Gable			

Figure 2: An example report in calendar format

Preferred Uses

- It is perfect for a small business (e.g., a restaurant) that must staff several locations across several shifts while it is seemingly impossible to accommodate every employee's desires of when and where they wish to work (or not work).
- A mid-sized firm where most employees are working from home each day, but a small percentage must be scheduled to come into the office periodically.
- Sports team where only x out of y team members can play each game. We would be scheduling the team at various game venues and start times.
- Or a sports league scheduling teams to play at various venues each week.

Here are just a few examples of how you might define the context, who, what, where, when, and why to change the scheduling. Again, just for readability, we are writing this document in terms of the values in the green cells that are the defaults in the tool.

Key Scheduling Elements		Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7
Small Business	(context)	Business	Restaurant	Baseball Team	Baseball Umpire	Basketball Team	Rental	Sports Team
Employees	(who)	People	Associates	Players	Umpires	Kids	Equipment	Teams
Working	(what)	Working	Working	Playing	Umping	Competing	Operating	Competing
Office/Loc	(where)	Office	Restaurant	Field	Venue	Court	Job site	Field
Shift	(when)	Workshift	Start time	Game time	Game	Time	Session	Game Slot
Role	(why)	Jobrole	Job	Position	Base Ump	Home/Away	Loan	Home/Away

Goals

- Give each employee/team member about the same number of scheduled assignments while being mindful of their personal scheduling restrictions.
- Vary the employee assignment mix enough so that each employee gets some in-office face time with all other employees at least once. (Sufficient scheduling duration is required depending on total employee count).
- Make sure each role is staffed at each Office/Location & Shift.
- Revise the schedule instantly when business parameters change or employees and their scheduling restrictions change.
- Share the calculated schedule in a variety of ways.
- No macros. This tool is distributed without any VBS (macros) on purpose to appeal to the widest audience.
- No random functions. No part of the scheduling calculations uses the built in Excel "random" functions to pick employees to fill work slots. While this might have made things easier on my part the user would see every report change each time, they made small changes and that makes for a bad user experience.

How does it schedule people to work?

You pick how far out you want to generate a schedule for, and the tool will, for each date, schedule employees to work at each office/shift/role work slot you profile. It allows you to customize its scheduling method to vary how the next employee is chosen to fill an available slot. No employee will be scheduled twice on the same date. You control how often each employee can be repeat scheduled. Each Office/Location & Shift can have up to 10 roles scheduled to work, such as Staff or Mgr. or Waitress. You make up the roles and configure the tool to schedule xx employees per role. These can vary by Office/Location & Shift.

Scheduling conflicts

There may be times when this tool is unable to schedule an employee in a work slot. When that happens, it will display a "C" or "Conflict" and leave it up to you to resolve in some way. Here is a list of potential reasons why this may occur:

- o Too few employees to staff all the profiled offices/shifts work slots.
- o Too few employees listed as a specific role to staff all the roles you have profiled.
- o Too many employee scheduling restrictions are in place preventing potentially available employees from being scheduled in each work slot. Restrictions related to Office, Shift, Days of the Week, or Dates

Artificial limits and suggested limits

This tool does some serious dynamic array-based calculations and will really tax Excel's calculation engine if you make it do too much. We have limited the number of employees to 100. The duration of the schedule is also suggested to be no more than 365 days. As you approach these limits you may see excel pause for many seconds after hitting enter while it recalculates - this is normal, just wait.

How do I use the tool?

1. On the Options sheet, profile your context by entering/changing data, including how many employees you have in total, duration of the schedule you want to create, list of roles, list of shift names, list of offices/shifts with how many total employees must be staffed at each office by role, what your normal days of operation are for your business (e.g. Mon-Fri), and also decide if you want to schedule employees by the day or by the week (this means the same set of scheduled employees will work together the entire week).
2. On the Holidays sheet, enter any Holidays that your business will be closed and that the tool will avoid when scheduling.
3. On the Names sheet, enter the name of each employee and what role(s) they fulfill. Gather from each employee any work restrictions they might have and enter this information. You might want to start with no restrictions, create a schedule, share it with employees, and then let them tell you which dates are bad for them and why. Then record their restrictions and regenerate the schedule.
4. View the various reports sheets and see how things look. Do you have enough coverage by role? Do you have enough people marked in each role given recorded vacation time? Do you have any scheduling conflicts noted in the reports? Did each employee get about the same number of assignments? Do you care about face time with other employees and if so, is the Never Worked Together sheet sparse?
5. Decide if you want to schedule 1 or 2 months out and then repeat every month, or if you want to create a schedule for the next 6, 9 or 12 months and stick to it.
6. Communicate the results to your employees by sharing or printing the various reports sheets or by using the export sheet to create a file to import to a shared Google Calendar.
7. Accommodating changes... when employees inevitably come back to you with additional or changed work restrictions you can take these approaches.
    - A) Keep the schedule - let each employee worry about finding a substitute employee to take their work slot

B) Generate a new schedule - Record the employee's new restrictions and regenerate a schedule. Keep in mind, this may change the work assignments of many other employees from the last published schedule.

C) Generate a new schedule for just that employee - Use the Override sheet to lock in all employee schedules except the employee in question. The tool will just reassign that employee's work slots.

Getting to know this tool

The tool comes loaded with sample employee data with scheduling restrictions coded to show you all the capabilities. They sometimes get in the way until you understand them. So, I suggest when first starting out, configure the tool as follows to see and understand how it works. You may wish to read ahead to the sections that describe the Options and Names sheets in more detail – that is where these inputs are changed.

o Set the **Restrictions** flag on the Options sheet to Off
o Set the **Method** to 1 on the Options sheet, so it sequentially assigns employees.
o Change the **Role Name** table on the Options sheet to just list the default Staff role.
o Change the **Shift Name** table to just list 1 shift called s1.
o Change the **Office/Loc** table on the Options sheet so that it lists only one Office on shift s1.
o Change the **Employees** table on the Names sheet and delete all the entries in the Roles column. That will make all employees regular "Staff" employees.

Then view the various reports sheets. Go back and start playing with Options sheet changes one by one to see how things change. Slowly add different roles for each employee.

Initial/Default Value on the Options Sheet		Change them to this to make learning the tool easier	

Core Option Name	Core Value
# of Employees	70
Begin Sched	
End Sched	
Period	Days
Sched Days	0000011
Restrictions	On
Method	

Core Option Name	Core Value
# of Employees	70
Begin Sched	
End Sched	
Period	Days
Sched Days	0000011
Restrictions	Off
Method	1

Role Name	Count	Max Assign	Role Description
Staff	64	2	Default staff emplo
Mgr	3	4	Manager

Role Name	Count	Max Assign	Role Description
Staff	64	2	Default staff emplo

Shift Name	Start Time	Hours
s1	6:00:00 AM	8
s2	2:00:00 PM	8
s3	10:00:00 PM	8
7-11	7:00:00 AM	4
11-3	11:00:00 AM	4
3-7	3:00:00 PM	4

Shift Name	Start Time	Hours
s1	6:00:00 AM	8

Office/Loc Name	Shift Name	Staff	Mgr
Main	s1	10	2
Spring St.	s2	3	
Uptown	s3	5	1

Office/Loc Name	Shift Name	Staff	
Main	s1	10	

ID	Employees	Only Schedule Restrictions (Include)	Never Schedule Restrictions (Exclude)	Role(s)
1	Audrey Hepburn		Monday, 6/14/2021	
2	Ava Gardner	Friday, Monday		
3	Barbara Stanwyck			
4	Bette Davis		5/29/2021, 6/30/2021	
5	Burt Lancaster			Mgr
6	Buster Keaton		Wednesday, 6/7/2021	
7	Carole Lombard	Main		
8	Cary Grant	s1		
9	Charlie Chaplin			
10	Clark Gable			Mgr
11	Claudette Colbert		Uptown	
12	Edward G. Robinson		s2	
13	Elizabeth Taylor			
14	Fred Astaire			Mgr, defwhy
15	Gary Cooper		Friday, 7/1/2021, Thursday	
16	Gene Kelly	Uptown, Spring St.		
17	Ginger Rogers			Team Lead
18	Grace Kelly			
19	Gregory Peck	s2		
20	Greta Garbo		5/25/2021-6/1/2021, 6/29/2021-7/10/2021	
21	Henry Fonda			Team Lead
22	Humphrey Bogart	s2, s3, Wednesday		
23	Ingrid Bergman			
24	James Cagney			Team Lead

ID	Employees	Only Schedule Restrictions (Include)	Never Schedule Restrictions (Exclude)	Role(s)
1	Audrey Hepburn		Monday, 6/14/2021	
2	Ava Gardner	Friday, Monday		
3	Barbara Stanwyck			
4	Bette Davis		5/29/2021, 6/30/2021	
5	Burt Lancaster			
6	Buster Keaton		Wednesday, 6/7/2021	
7	Carole Lombard	Main		
8	Cary Grant	s1		
9	Charlie Chaplin			
10	Clark Gable			
11	Claudette Colbert		Uptown	
12	Edward G. Robinson		s2	
13	Elizabeth Taylor			
14	Fred Astaire			
15	Gary Cooper		Friday, 7/1/2021, Thursday	
16	Gene Kelly	Uptown, Spring St.		
17	Ginger Rogers			
18	Grace Kelly			
19	Gregory Peck	s2		
20	Greta Garbo		5/25/2021-6/1/2021, 6/29/2021-7/10/2021	
21	Henry Fonda			
22	Humphrey Bogart	s2, s3, Wednesday		
23	Ingrid Bergman			
24	James Cagney			

Structure of the Excel File

Sheets in the Excel file

Sheet Name	Type	Description
Read Me	Info	An intro to what this tool does.
Options	Input	Where you enter and change options that govern the operation of this tool.
Holidays	Input	A place to record Holidays. No employee will be scheduled to work on these holidays.
Names	Input	A place to record a list of employee names, the roles they work in, and any scheduling restrictions that employee might have (e.g., vacations).
Override	Input	A place to override the scheduling algorithm and force specific employees into specific work slots. Also, a place to "lock in the schedule".
Flat Assign	Calculation	The main workhorse of this tool. A list of all possible dates, offices, shifts, roles, and staffing slots paired with the employee scheduled to work that slot.
Grid Assign ID	Report	A report showing the data from Flat Assign in a grid of date by office/shift/slot. Easy to see the set of Employee IDs scheduled to work on a given day across all offices/shifts.
Grid Assign Name	Report	A duplicate of Grid Assign ID using Employee Names instead of IDs.
Full Grid	Report	A report showing the assignments from Flat Assign in a grid of date by employee. The grid contains an indicator if that employee is scheduled to work that day or a scheduling restriction marker (if any).
Bad Where (When)	Report	A report showing a grid of where (when) Office/Loc (Shift) by employee indicating if that employee has a scheduling restriction preventing them from being scheduled for a given office/shift.

Bad Dates	Report	A report showing a grid of date by employee indicating if that employee has a scheduling restriction preventing them from being scheduled for a given date.
Calendar	Report	A series of monthly calendars over the span of 1 year from the start of the schedule showing content determined by the Cal Content sheet.
Cal Content	Calculation	Where we calculate the list of employee names scheduled to work in each Office (shift). You control which one via the (caldisplay) option. These will appear on the Calendar sheet.
Export Google	Export	The employee schedule for all Office/Locs & Shifts that you can export to a csv file for import to a shared Google Calendar.
Export Outlook	Export	The employee schedule for all Office/Locs & Shifts that you can export to a csv file for import to a shared Microsoft Outlook Calendar.
Never Worked Together	Report	A report showing a grid of employee by employee with an indicator if the employee pair have never been scheduled to work together on the same date.
Worked Together	Calculation	A grid of employee by employee counting how many times each employee pairing has been scheduled to work together on a given shift.

The Options Sheet

This is where you set options/defaults that govern the operation of this scheduling tool. Enter only in the green cells.

Key Scheduling Elements

- **Context** describes the context in which this scheduling application will be doing its scheduling.
- **Who** represents the group of people that is being scheduled? Sometimes this can be a group of things.
- **What** is an action that describes what the people will be doing when they are scheduled?
- **Where** depicts a location where the people should be when they are scheduled to do what.
- **When** describes when the people should be at the where to do the what when they are scheduled.
- **Why** describes the purpose why the people are scheduled. A more refined description of the (what).

Below you will see 7 different examples to get you thinking about how to configure the scheduling tool. You can stick with the defaults entered in the green cells or overtype them.

Key Scheduling Elements		Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7
Small Business	(context)	Business	Restaurant	Baseball Team	Baseball Umpire	Basketball Team	Rental	Sports Team
Employees	(who)	People	Associates	Players	Umpires	Kids	Equipment	Teams
Working	(what)	Working	Working	Playing	Umping	Competing	Operating	Competing
Office/Loc	(where)	Office	Restaurant	Field	Venue	Court	Job site	Field
Shift	(when)	Workshift	Start time	Game time	Game	Time	Session	Game Slot
Role	(why)	Jobrole	Job	Position	Base Ump	Home/Away	Loan	Home/Away

Given these defaults, within the context of a (Small Business), (Employees) will be scheduled to be (Working) at one of the (Office/Loc's) during one of the (Shift's) satisfying a required (Role).

Core Options

Core Option Name	Core Value
# of Employees	70
Begin Sched	
End Sched	
Period	Days
Sched Days	0000011
Restrictions	On
Method	

- **# Of Employees** is how many total employees you have on staff that we can draw from to do assignments. This will change based on the (who) value. (e.g., it could read "# of Players").
- **Begin Sched** is a date representing the start of the schedule. If blank it will be next Monday.
- **End Sched** is a date representing the end of the schedule. If blank it will be (beginsched) + 90 days.
- **Period** is either "Days" or "Weeks" and it determines the level at which work assignments are made.
- **Sched Days** is a string of 0's or 1's for each day of the week to say if it is a scheduled day or not. 0 means yes, 1 means no. "0000011" is a standard work week in the US with Saturday and Sunday off.
- **Restrictions** is either On or Off. If Off, it ignores any scheduling restrictions entered on the Names sheet.
- **Method** Blank is the default, and it picks the next Employee in the rotation of assignments based on a semi-random number. Or you can choose 1 through 9 to use a skipping method of n employees. This is hard to describe. I suggest you set restrictions to off and try various settings of (method), each time viewing the Full Grid sheet to see the pattern of assignments.

The (why) table (e.g., Roles Names)

Role Name	Count	Max Assign	Role Description
Staff	64	2	Default staff emplo
Mgr	3	4	Manager

You can designate up to 10 entries. The first entry is required, and it becomes the default (why). In this example our (why) value is "Role" and the default Role is called "Staff". You do not have to define any additional roles if all your Employees are equal. We will treat them all as "Staff". That is, if you just care about a count of people being scheduled each period versus what kind of person is being scheduled. Remember to mark which Employees have which Roles in the Names sheet.

- **Role Name** is a name by which you refer to the role. The first role listed becomes the default – in this example "Staff". You can define up to 10 total roles. The table is pre-

loaded with sample role names. Delete them if you do not want them. You should populate the Roles column in the Names sheet with these Role Names.

- **Count** shows how many employees on the Names sheet have that role. This reminds you if you defined a role but have not tagged any employee on the Names sheet with that role name.
- **Max Assign** is calculated and controls how many repeat assignments a given employee can have (see the note in the header for more explanation). It ranges from 2 to (rowcnt).
- **Description** is optional - just for you to use to describe the role.

The (when) table (e.g., Shift Names)

Shift Name	Start Time	Hours
s1	6:00:00 AM	8
s2	2:00:00 PM	8
s3	10:00:00 PM	8
7-11	7:00:00 AM	4
11-3	11:00:00 AM	4
3-7	3:00:00 PM	4

You can designate up to 10 Shifts. Give each shift a name such as "1" or "s2" or "Third".

- **Shift Name** is a name you will use to refer to the shift. It will print out on all reports using this name.
- **Start Time** is a time when employees working on this shift are expected to start work.
- **Hours** is a number representing how long the shift lasts. On the Google and Outlook calendars the end time will appear as Start Time plus this hour value.

You might wish to define different shift names that will be used for weekend work versus weekday work.

The (where) table (e.g., Office/Loc Names)

You can designate up to 20 Office/Location & Shifts to schedule employees into.

Office/Loc Name	Shift Name	Staff	Mgr	Role Names from the Role table above							Total
Main	s1	10	2								12
Spring St.	s2	3									3
Uptown	s3	5	1								6

- **Office/Loc** Each Office/Location has its own name - enter whatever your business uses to refer to a particular Office/Location. There is always a default of one Office/Location if you do not enter one and it will be called "Main".
- **Shift Name** is one of the shift names you defined above. This defaults to "s1" if you do not enter a shift for a given Office/Location. If a given office is open for 2 or 3 shifts, you must use separate rows in this table (change the shift name on each row).

- **Roles…** The default role (e.g., Staff) followed by any other roles you defined in the Roles table. Enter a count of employees with that role you wish to schedule each period into this Office/Loc & Shift. Allowable values are 1 to (employees). Notes:
  - Any employee may be given a single role or multiple roles in the Names sheet.
  - If you define a role such as "Chef" and no employee is labeled with that role, then no one will ever be assigned those work slots.
- **Total** is calculated as the sum of required employees across all roles (including the general "Staff" role) for that Office/Loc & Shift.

An entry in this table for Office/Loc, Shift Name, and Role=Staff of "Main, s1, 3" means the Office/Loc called Main is staffed, on shift "s1", with 3 general Staff employees. You could have another row for the same Office/Loc such as "Main, s2, 1" meaning only 1 employee of the general Staff role works at the Main office on shift "s2".

Labels

In this tool, when referring to an Office/Loc & Shift, reports will display **"Office/Loc (Shift Name)"**. So, in my example, "Main (s1) and Main (s2)" would display to refer to the 2 shifts of staffing at the Main office.

Labels by Office/Loc					
Main (s1) [Staff] #1	Main (s1) [Staff] #2	Main (s1) [Staff] #3	Main (s1) [Staff] #4	Main (s1) [Staff] #5	Main (s1) [Staff] #6
Spring St. (s2) [Staff] #1	Spring St. (s2) [Staff] #2	Spring St. (s2) [Staff] #3			
Uptown (s3) [Staff] #1	Uptown (s3) [Staff] #2	Uptown (s3) [Staff] #3	Uptown (s3) [Staff] #4	Uptown (s3) [Staff] #5	Uptown (s3) [Mgr] #1

When referring to employees scheduled to work at a particular Office/Location & Shift, you will see the employee role and a sequential number to indicate the scheduling slot. The general format is **"Office/Loc (Shift Name) [Role Name] #x"**. So, the 4 general staff employees assigned to work at the Main office across 2 shifts would be displayed as:

- Main (s1) [Staff] #1
- Main (s1) [Staff] #2
- Main (s1) [Staff] #3
- Main (s2) [Staff] #1

Further, if you had also specified 2 employees with a role of Team Lead to work at the Main office on shift "third", you would see:

- Main (third) [Team Lead] #1
- Main (third) [Team Lead] #2

Role table, Shift table, and Office/Loc table Defaults:

If you blank out the entire Roles table, Shift table, and Office/Loc table, the tool will assume one Office/Loc called "Main", staffing shift "s1", with 2 employees, each having the general "Staff" role, and repeating no more than 3 times in a scheduling period.

Calendar Related Options

Cal Display	Main (s1)

- **(caldisplay)** allows you to choose one Office/Loc (Shift) to be displayed on the built-in Calendar sheet. All employees scheduled to work at that Office/Loc on that Shift will appear in the Calendar sheet. This only affects the built-in Calendar sheet, not the exports to Google Calendar and Microsoft Outlook Calendar. Those two always have entries for all Office/Locs and shifts, whereas the built-in Calendar sheet displays content for only one Office/Loc (Shift).

The Holidays Sheet

Holiday Table

Fill out this (optional) table with any dates your business considers a holiday. The tool will avoid scheduling an employee to work on these dates. If there is a real holiday like Christmas and your business is open that day, then do not include it in this table. You can avoid scheduling employees on that date by using the scheduling restrictions table on the Names sheet.

Date	Holiday
1/1/2021	New Year's Day
1/18/2021	Martin Luther King Jr. Day
1/20/2021	Inauguration Day
2/15/2021	Presidents' Day
5/31/2021	Memorial Day
7/4/2021	Independence Day
7/5/2021	Independence Day observed
9/6/2021	Labor Day
10/11/2021	Columbus Day
11/11/2021	Veterans Day
11/25/2021	Thanksgiving Day
12/24/2021	Day off for Christmas Day
12/25/2021	Christmas Day
12/31/2021	Day off for New Year's Day
1/1/2022	New Year's Day
1/17/2022	Martin Luther King Jr. Day
2/15/2021	Presidents' Day
5/30/2022	Memorial Day
7/4/2022	Independence Day
9/5/2022	Labor Day
10/10/2022	Columbus Day
11/11/2022	Veterans Day
11/24/2022	Thanksgiving Day
12/24/2022	Christmas Eve
12/25/2022	Christmas Day
12/31/2022	New Year's Eve

The Names Sheet

The (who) table (e.g., Employee Names)

This is where you designate names for each employee and where you denote scheduling restrictions if any. Enter only in the green cells.

ID	Employee name	Only Schedule Restrictions (Include)	Never Schedule Restrictions (Exclude)	Roles
1	Audrey Hepburn		Monday, 6/14/2021	
2	Ava Gardner	Friday, Monday		
3	Barbara Stanwyck			
4	Bette Davis		5/29/2021, 6/30/2021	
5	Burt Lancaster			Mgr
6	Buster Keaton		Wednesday, 6/7/2021	
7	Carole Lombard	Main		
8	Cary Grant	s1		
9	Charlie Chaplin			
10	Clark Gable			Mgr
11	Claudette Colbert		Uptown	
12	Edward G. Robinson		s2	
13	Elizabeth Taylor			
14	Fred Astaire			Mgr, Staff
15	Gary Cooper		Friday, 7/1/2021, Thursday	
16	Gene Kelly	Uptown, Spring St.		
17	Ginger Rogers			Team Lead
18	Grace Kelly			
19	Gregory Peck	s2		
20	Greta Garbo		5/25/2021-6/1/2021, 6/29/2021-7/10/2021	
21	Henry Fonda			Team Lead
22	Humphrey Bogart	s2, s3, Wednesday		
23	Ingrid Bergman			
24	James Cagney			Team Lead
25	James Dean	s1		
26	James Stewart		Main, s2	
27	Jean Harlow			
28	Joan Crawford	Main, s1, Thursday		
29	John Wayne			
30	Judy Garland			

Warning, there is a setting on the Options tab called (restrictions) that controls whether we honor these scheduling restrictions or not.

ID: First, on the Options sheet you said how many employees you have. That sequence is in column A and it becomes the employee ID within this tool. You cannot change this even if your business happens to have its own employee IDs.

Employee Name: In the Employee Name column, type whatever name you use to refer to this employee. There are sample names loaded, just type over them. If an employee quits or is fired, or a new employee hires on, please see **Employee Changes**.

Only Schedule Restrictions (Include): In the next 2 columns you "code" whatever restrictions there might be for each employee. In col C "Only Schedule Restrictions" you may code any of these items:

Weekday name   e.g., Wednesday, Monday

Office/Loc name   e.g., any of entries in the (where) table (e.g., Office/Loc) like Main

Shift name   e.g., any (when) entry (e.g., Shifts) like s1, s2, s3, second, 7-11, etc.

You can record multiple of these by separating them with a comma. An entry in this column means the employee assignment is restricted to only these days, offices, and/or shifts.

Never Schedule Restrictions (Exclude): By contrast, col D "Never Schedule Restrictions" is coded to denote when this employee should never be scheduled. You can code the same 3 items as listed above for the "Only Schedule Restrictions" (Days, Office/Locs, and/or Shifts). But you can also code two additional items if needed:

A single date   e.g., 10/29/2021

A span of dates   e.g., 10/29/2021-11/7/2021

These will likely be used to record when each employee has scheduled personal vacation days.

Together, these 2 columns tell the tool if it is ok to schedule an employee on a certain date, in a certain office, for a certain shift. Be careful not to code contradictory information such as "only on s2" and "never on s2" because that will have the net effect of never scheduling that employee.

Roles: The Roles column can be blank which means the employee has the default Role from the Roles table and in this context it is the general "Staff" role. People designated as "Staff" can be assigned to any Office/Loc and Shift to fill the qty of workers needed for the "Staff" role in the Office/Loc table on the Options sheet. You could also code the role "Staff" for these employees, but it is unnecessary since most employees will be of this role type.

You can also enter the name of any other Role you defined in the Roles table on the Options sheet. For example, if you defined a role of "Team Lead" you can enter that for each employee you consider a Team Lead.

Examples of Multiple Roles:

If you want a given employee to be chosen to fill work slots labeled "Team Lead" or "Staff", you must list both roles like this: Team Lead, Staff

If you just list "Team Lead" as the role, they will only be chosen to fill "Team Lead" work slots.

If you have a superstar employee capable of performing any role and you want them scheduled into any work slot, you must list all roles for that employee: e.g., Staff, Mgr, Team Lead, Chef

The Override Sheet

The Override Table

This is where you can force overrides into the scheduling. The structure of this sheet is the same as the Flat Assign sheet. You can either manually enter data to force a specific employee to fill a specific work slot, or (the preferred approach) you can copy and paste the data from the Flat Assign sheet into this sheet to "lock in a schedule".

Date	Office (Shift) [Role] #n	ID	Employee Name
Monday, May 17, 2021	Main (s1) [Staff] #1	23	Ingrid Bergman
Monday, May 17, 2021	Main (s1) [Staff] #2	67	Shantanu Narayen
Monday, May 17, 2021	Main (s1) [Staff] #3	18	Grace Kelly
Monday, May 17, 2021	Main (s1) [Staff] #4	15	Gary Cooper
Monday, May 17, 2021	Main (s1) [Staff] #5	58	Ian Siegel
Monday, May 17, 2021	Main (s1) [Staff] #6	7	Carole Lombard
Monday, May 17, 2021	Main (s1) [Staff] #7	2	Ava Gardner
Monday, May 17, 2021	Main (s1) [Staff] #8	43	Rita Hayworth
Monday, May 17, 2021	Main (s1) [Staff] #9	60	Lynn Jurich
Monday, May 17, 2021	Main (s1) [Staff] #10	53	Brian Halligan
Tuesday, May 18, 2021	Main (s1) [Staff] #1	27	Jean Harlow
Tuesday, May 18, 2021	Main (s1) [Staff] #2	66	Satya Nadella
Tuesday, May 18, 2021	Main (s1) [Staff] #3	14	Fred Astaire
Tuesday, May 18, 2021	Main (s1) [Staff] #4	11	Claudette Colbert
Tuesday, May 18, 2021	Main (s1) [Staff] #5	54	Dan Rosensweig
Tuesday, May 18, 2021	Main (s1) [Staff] #6	6	Buster Keaton
Tuesday, May 18, 2021	Main (s1) [Staff] #7	7	Carole Lombard
Tuesday, May 18, 2021	Main (s1) [Staff] #8	55	Daniel Dines
Tuesday, May 18, 2021	Main (s1) [Staff] #9	12	Edward G. Robinson
Tuesday, May 18, 2021	Main (s1) [Staff] #10	15	Gary Cooper
Wednesday, May 19, 2021	Main (s1) [Staff] #1	60	Lynn Jurich
Wednesday, May 19, 2021	Main (s1) [Staff] #2	65	Ryan Smith
Wednesday, May 19, 2021	Main (s1) [Staff] #3	50	William Holden
Wednesday, May 19, 2021	Main (s1) [Staff] #4	16	Gene Kelly
Wednesday, May 19, 2021	Main (s1) [Staff] #5	30	Judy Garland
Wednesday, May 19, 2021	Main (s1) [Staff] #6	25	James Dean
Wednesday, May 19, 2021	Main (s1) [Staff] #7	70	Vlad Shmunis
Wednesday, May 19, 2021	Main (s1) [Staff] #8	27	Jean Harlow
Wednesday, May 19, 2021	Main (s1) [Staff] #9	31	Katharine Hepburn
Wednesday, May 19, 2021	Main (s1) [Staff] #10	18	Grace Kelly

If you paste data into this sheet, do so by pasting values only. On the Paste icon, look for Paste Special and then choose Values. You can copy and paste the entire schedule from Flat Assign or just a portion of it. The Employee Name column is optional (only the first 3 columns are referenced).

A typical use case might be to create a schedule based on playing with various Options. Once you are satisfied, copy the whole schedule to this sheet. Publish it to your employees. When/if employees come back to you requesting changes, filter this sheet for that employee's schedule and either manually change it or delete that employee's rows. Deleting rows causes the tool to assign a new employee into that work slot. Repeat, as necessary.

The Flat Assign Sheet

This is the main calculation sheet that determines the schedule of where and when each employee is assigned to work.

Date	Office (Shift) [Role] #n	ID	Employee Name	Override	Validation		1
Monday, May 17, 2021	Main (s1) [Staff] #1	23	Ingrid Bergman		1=XW		
Monday, May 17, 2021	Main (s1) [Staff] #2	67	Shantanu Narayen		1=XW		
Monday, May 17, 2021	Main (s1) [Staff] #3	18	Grace Kelly		1=XW		
Monday, May 17, 2021	Main (s1) [Staff] #4	15	Gary Cooper		1=XW		
Monday, May 17, 2021	Main (s1) [Staff] #5	58	Ian Siegel		1=XW		
Monday, May 17, 2021	Main (s1) [Staff] #6	7	Carole Lombard		1=XW		
Monday, May 17, 2021	Main (s1) [Staff] #7	2	Ava Gardner		1=XW		
Monday, May 17, 2021	Main (s1) [Staff] #8	43	Rita Hayworth		1=XW		
Monday, May 17, 2021	Main (s1) [Staff] #9	60	Lynn Jurich		1=XW		
Monday, May 17, 2021	Main (s1) [Staff] #10	53	Brian Halligan		1=XW		
Monday, May 17, 2021	Main (s1) [Mgr] #1	5	Burt Lancaster		1=XW		
Monday, May 17, 2021	Main (s1) [Mgr] #2	10	Clark Gable		1=XW		
Monday, May 17, 2021	Spring St. (s2) [Staff] #1	29	John Wayne		1=XW		
Monday, May 17, 2021	Spring St. (s2) [Staff] #2	65	Ryan Smith		1=XW		
Monday, May 17, 2021	Spring St. (s2) [Staff] #3	9	Charlie Chaplin		1=XW		
Monday, May 17, 2021	Uptown (s3) [Staff] #1	68	Sundar Pichai		1=XW		
Monday, May 17, 2021	Uptown (s3) [Staff] #2	32	Kirk Douglas		1=XW		
Monday, May 17, 2021	Uptown (s3) [Staff] #3	44	Robert Mitchum		1=XW		
Monday, May 17, 2021	Uptown (s3) [Staff] #4	30	Judy Garland		1=XW		
Monday, May 17, 2021	Uptown (s3) [Staff] #5	63	Patrick Pacious		1=XW		
Monday, May 17, 2021	Uptown (s3) [Mgr] #1	14	Fred Astaire		1=XW		
Tuesday, May 18, 2021	Main (s1) [Staff] #1	27	Jean Harlow				
Tuesday, May 18, 2021	Main (s1) [Staff] #2	34	Laurence Olivier				
Tuesday, May 18, 2021	Main (s1) [Staff] #3	20	Greta Garbo				
Tuesday, May 18, 2021	Main (s1) [Staff] #4	54	Dan Rosensweig				
Tuesday, May 18, 2021	Main (s1) [Staff] #5	66	Satya Nadella				
Tuesday, May 18, 2021	Main (s1) [Staff] #6	56	Eric Yuan				
Tuesday, May 18, 2021	Main (s1) [Staff] #7	25	James Dean				
Tuesday, May 18, 2021	Main (s1) [Staff] #8	40	Marx Brothers				
Tuesday, May 18, 2021	Main (s1) [Staff] #9	35	Lillian Gish				
Tuesday, May 18, 2021	Main (s1) [Staff] #10	6	Buster Keaton				
Tuesday, May 18, 2021	Main (s1) [Mgr] #1	5	Burt Lancaster		1=RM		
Tuesday, May 18, 2021	Main (s1) [Mgr] #2	10	Clark Gable		1=RM		
Tuesday, May 18, 2021	Spring St. (s2) [Staff] #1	70	Vlad Shmunis				
Tuesday, May 18, 2021	Spring St. (s2) [Staff] #2	29	John Wayne				
Tuesday, May 18, 2021	Spring St. (s2) [Staff] #3	30	Judy Garland				
Tuesday, May 18, 2021	Uptown (s3) [Staff] #1	9	Charlie Chaplin				
Tuesday, May 18, 2021	Uptown (s3) [Staff] #2	36	Mae West				
Tuesday, May 18, 2021	Uptown (s3) [Staff] #3	41	Mary Pickford				
Tuesday, May 18, 2021	Uptown (s3) [Staff] #4	26	James Stewart				
Tuesday, May 18, 2021	Uptown (s3) [Staff] #5	57	Henry Schuck				
Tuesday, May 18, 2021	Uptown (s3) [Mgr] #1	14	Fred Astaire		1=RM		

Date: Every date to be scheduled in the scheduling period between Start Date and End Date. Any holidays are excluded. Any days of the week not scheduled based on the (workdays) option are also excluded.

Office (Shift) [Role] #n: Each Office/Loc, Shift, and Role required to be scheduled on each date according to the Office/Loc table on the Options sheet.

ID: Col C (ID) does the employee assignment using the (method) chosen on the Options sheet. The default assignment method attempts to randomize who works when, such that each employee gets about the same number of work assignments and is mixed up enough to have been paired to work with each other employee at least once. There is no guarantee here, so check the sheet "Never Worked Together" if this is critical.

Each employee can only be scheduled once per day even though it is technically possible for a given employee to work on 2 or 3 different shifts of the same day.

"C" for "Conflict" - when this appears in the ID column it means the automatic scheduling logic found no employee without scheduling restrictions that could have been chosen to fill this work slot.

Employee Name: Col E is just the Name lookup that goes with the employee ID matching the calculated ID to the Names table on the Names sheet.

Override: You can make entries on the Override sheet to force a given employee to fill a specific work slot. They will be transferred to col E (Override) and that employee ID will be scheduled in place of the automatic logic.

Validation: If you want to check and see why a particular employee was not eligible to fill each work slot you can enter that employee ID in the green entry cell on the top row. The Validate column will be filled with various codes you can examine that all take the form:

ID=Code

blank - No restrictions are in place. The employee ID in the green cell at top was eligible to fill this work slot (whether they were chosen or not).

Codes related to (where) (e.g., Office/Loc) or (when) (e.g., Shift)
- IT - Include Time. A (when) shift restriction based on "Only Schedule Restriction" on the Names sheet. Example, employee only works on s2 and this row is a shift of s1.
- XT - Exclude Time. A (when) shift restriction based on "Never Schedule Restriction" on the Names sheet. Example, employee never works on s2 and this row is for s2.
- IL - Include Loc. An (where) office restriction based on "Only Schedule Restriction" on the Names sheet. Example, employee only works in the Main office and this row is for the Spring St. office.
- XL - Exclude Loc. An (where) office restriction based on "Never Schedule Restriction" on the Name sheet. Example, employee never works in the Main office and this row is for the Main office.

Codes related to weekday or actual date
- IW - Include Weekday. A weekday restriction based on "Only Schedule Restriction" on the Names sheet. Example, employee only works on Wednesday and this row is for Monday.
- XW - Exclude Weekday. A weekday restriction based on "Never Schedule Restriction" on the Names sheet. Example, employee never works on Monday and this row is a Monday.

- XD - Exclude date. A date restriction based on "Never Schedule Restriction" on the Names sheet. Example, employee never works on 5/1/2021 and this row is for date 5/1/2021.

Codes related to repeat or duplicate assignments
- RA - Repeat Assignment. The max repeat assignment threshold for their role would be exceeded. Example, employee was already scheduled 2 times in the current scheduling period and the max is calculated to be 2, so if we were to assign them on this row it would make 3 assignments.
  - *Note on the RA (Repeat Assignment) code:* The amount of times a given employee can be repeat scheduled within a scheduling period is controlled by the Roles table on the Options sheet. The tool determines a count from 2 to (rowcnt) where (rowcnt) is essentially how many consecutive days it takes to schedule all employees. For example, if you have 30 employees and 12 must be (inoffice) each day, then (rowcnt) becomes 3 (it takes 3 days at 12 people/day to exceed 30 employees).
- AS - Already Scheduled. The employee ID was already scheduled for this date. Example, the row is for date 5/1/2021 and this employee was already assigned on another row for this same date.

Codes related to role
- RM - Role Mismatch. The (why) (e.g., Role) of the (who) (e.g., Employee) does not match the required role for the work slot. Example, this employee is a role of Technician and this row is calling for a Manager to be assigned.

The Grid Assign ID Sheet

This simply takes the employee ID's in the Flat Assign sheet and maps them into this grid that shows the Office/Locs and Shifts for each date. A "C" means Conflict and basically says there was no employee without work restrictions or built-in internal scheduling restrictions that could have been chosen to work in this slot. A sample portion of such a sheet appears below as an example. This is not really intended for the scheduler or for any employee unless you are intimately familiar with employee ID's. It is, however, key to other parts of the tool to know the complete set of employees scheduled on one date. On this sheet there is one row per date scheduled and one column per "Office/Loc (Shift) [Role] #x".

	Main (s1) [Staff] #1	Main (s1) [Staff] #2	Main (s1) [Staff] #3	Main (s1) [Staff] #4	Main (s1) [Staff] #5	Main (s1) [Staff] #6	Main (s1) [Staff] #7	Main (s1) [Staff] #8	Main (s1) [Staff] #9	Main (s1) [Staff] #10	Main (s1) [Mgr] #1	Main (s1) [Mgr] #2	Spring St. (s2) [Staff] #1	Spring St. (s2) [Staff] #2	Spring St. (s2) [Staff] #3	Uptown (s3) [Staff] #1	Uptown (s3) [Staff] #2	Uptown (s3) [Staff] #3	Uptown (s3) [Staff] #4	Uptown (s3) [Staff] #5	Uptown (s3) [Mgr] #1
Monday, May 17, 2021	23	67	18	15	58	7	2	43	60	53	5	10	29	65	9	68	32	44	30	63	14
Tuesday, May 18, 2021	27	34	20	54	66	56	25	40	35	6	5	10	70	29	30	9	36	41	26	57	14
Wednesday, May 19, 2021	31	15	50	65	60	35	61	66	51	18	5	10	70	27	32	16	52	67	62	36	14
Thursday, May 20, 2021	20	68	25	34	28	1	31	37	33	69	5	10	16	54	6	12	3	38	55	56	14
Friday, May 21, 2021	52	33	69	18	23	7	48	3	12	8	5	10	29	37	11	47	68	4	62	38	14
Monday, May 24, 2021	50	60	61	51	30	2	32	53	63	64	5	10	70	34	54	65	66	55	35	4	14
Tuesday, May 25, 2021	56	41	23	63	25	49	67	6	7	1	5	10	70	31	57	9	13	15	66	50	14
Wednesday, May 26, 2021	8	51	25	58	18	42	60	9	11	13	5	10	43	19	59	22	52	3	26	29	14
Thursday, May 27, 2021	27	6	52	28	68	35	69	30	53	3	5	10	42	47	48	45	38	29	12	64	14
Friday, May 28, 2021	27	31	32	33	23	18	7	67	54	40	5	10	56	34	11	55	26	66	35	70	14
Tuesday, June 1, 2021	12	62	48	40	38	43	53	68	23	49	5	10	30	15	69	63	64	70	13	31	14
Wednesday, June 2, 2021	51	65	15	44	18	56	39	32	33	36	5	10	37	4	54	41	34	42	43	57	14
Thursday, June 3, 2021	20	11	13	25	41	1	44	27	28	29	5	10	3	42	30	16	26	35	45	4	14

The Grid Assign Name Sheet

This translates the Grid Assign ID sheet from Employee ID's to Employee Names.

Date	Main (s1) [Staff] #1	Main (s1) [Staff] #2	Main (s1) [Staff] #3	Main (s1) [Staff] #4	Main (s1) [Staff] #5	Main (s1) [Staff] #6	Main (s1) [Staff] #7	Main (s1) [Staff] #8	Main (s1) [Staff] #9	Main (s1) [Staff] #10	Main (s1) [Mgr] #1	Main (s1) [Mgr] #2	Spring St. (s2) [Staff] #1	Spring St. (s2) [Staff] #2	Spring St. (s2) [Staff] #3	Uptown (s3) [Staff] #1	Uptown (s3) [Staff] #2	Uptown (s3) [Staff] #3	Uptown (s3) [Staff] #4	Uptown (s3) [Staff] #5	Uptown (s3) [Mgr] #1
Monday, May 17, 2021	Ingrid Bergman	Shantanu Narayen	Grace Kelly	Gary Cooper	Ian Siegel	Carole Lombard	Ava Gardner	Rita Hayworth	Lynn Jurich	Brian Halligan	Burt Lancaster	Clark Gable	John Wayne	Ryan Smith	Charlie Chaplin	Sundar Pichai	Kirk Douglas	Robert Mitchum	Judy Garland	Patrick Pacious	Fred Astaire
Tuesday, May 18, 2021	Jean Harlow	Laurence Olivier	Greta Garbo	Dan Rosensweig	Satya Nadella	Eric Yuan	James Dean	Marx Brothers	Lillian Gish	Buster Keaton	Burt Lancaster	Clark Gable	Vlad Shmunis	John Wayne	Judy Garland	Charlie Chaplin	Mae West	Mary Pickford	James Stewart	Henry Schuck	Fred Astaire
Wednesday, May 19, 2021	Katharine Hepburn	Gary Cooper	William Holden	Ryan Smith	Lynn Jurich	Lillian Gish	Manny Medina	Satya Nadella	Annette Brüls	Grace Kelly	Burt Lancaster	Clark Gable	Vlad Shmunis	Jean Harlow	Kirk Douglas	Gene Kelly	Bert Bean	Shantanu Narayen	Mitch Snyder	Mae West	Fred Astaire
Thursday, May 20, 2021	Greta Garbo	Sundar Pichai	James Dean	Laurence Olivier	Joan Crawford	Audrey Hepburn	Katharine Hepburn	Marilyn Monroe	Lauren Bacall	Timothy Cook	Burt Lancaster	Clark Gable	Gene Kelly	Dan Rosensweig	Buster Keaton	Edward G. Robinson	Barbara Stanwyck	Marlene Dietrich	Daniel Dines	Eric Yuan	Fred Astaire
Friday, May 21, 2021	Bert Bean	Lauren Bacall	Timothy Cook	Grace Kelly	Ingrid Bergman	Carole Lombard	Spencer Tracy	Barbara Stanwyck	Edward G. Robinson	Cary Grant	Burt Lancaster	Clark Gable	John Wayne	Marilyn Monroe	Claudette Colbert	Sophia Loren	Sundar Pichai	Bette Davis	Mitch Snyder	Marlene Dietrich	Fred Astaire
Monday, May 24, 2021	William Holden	Lynn Jurich	Manny Medina	Annette Brüls	Judy Garland	Ava Gardner	Kirk Douglas	Brian Halligan	Patrick Pacious	Robert Frist	Burt Lancaster	Clark Gable	Vlad Shmunis	Laurence Olivier	Dan Rosensweig	Ryan Smith	Satya Nadella	Daniel Dines	Lillian Gish	Bette Davis	Fred Astaire
Tuesday, May 25, 2021	Eric Yuan	Mary Pickford	Ingrid Bergman	Patrick Pacious	James Dean	Vivien Leigh	Shantanu Narayen	Buster Keaton	Carole Lombard	Audrey Hepburn	Burt Lancaster	Clark Gable	Vlad Shmunis	Katharine Hepburn	Charlie Chaplin	Elizabeth Taylor	Gary Cooper	Satya Nadella	William Holden		Fred Astaire
Wednesday, May 26, 2021	Cary Grant	Annette Brüls	James Dean	Ian Siegel	Grace Kelly	Orson Welles	Lynn Jurich	Charlie Chaplin	Claudette Colbert	Elizabeth Taylor	Burt Lancaster	Clark Gable	Rita Hayworth	Gregory Peck	John Foley	Humphrey Bogart	Bert Bean	Barbara Stanwyck	James Stewart	John Wayne	Fred Astaire
Thursday, May 27, 2021	Jean Harlow	Buster Keaton	Bert Bean	Joan Crawford	Sundar Pichai	Lillian Gish	Timothy Cook	Judy Garland	Brian Halligan	Barbara Stanwyck	Burt Lancaster	Clark Gable	Orson Welles	Sophia Loren	Spencer Tracy	Shirley Temple	Marlene Dietrich	John Wayne	Edward G. Robinson	Robert Frist	Fred Astaire
Friday, May 28, 2021	Jean Harlow	Katharine Hepburn	Kirk Douglas	Lauren Bacall	Ingrid Bergman	Grace Kelly	Carole Lombard	Shantanu Narayen	Dan Rosensweig	Marx Brothers	Burt Lancaster	Clark Gable	Eric Yuan	Laurence Olivier	Claudette Colbert	Daniel Dines	James Stewart	Satya Nadella	Lillian Gish	Vlad Shmunis	Fred Astaire
Tuesday, June 1, 2021	Edward G. Robinson	Mitch Snyder	Spencer Tracy	Marx Brothers	Marlene Dietrich	Rita Hayworth	Brian Halligan	Sundar Pichai	Ingrid Bergman	Vivien Leigh	Burt Lancaster	Clark Gable	Judy Garland	Gary Cooper	Timothy Cook	Patrick Pacious	Robert Frist	Vlad Shmunis	Elizabeth Taylor	Katharine Hepburn	Fred Astaire
Wednesday, June 2, 2021	Annette Brüls	Ryan Smith	Gary Cooper	Robert Mitchum	Grace Kelly	Eric Yuan	Marlon Brando	Kirk Douglas	Lauren Bacall	Mae West	Burt Lancaster	Clark Gable	Marilyn Monroe	Bette Davis	Dan Rosensweig	Mary Pickford	Laurence Olivier	Orson Welles	Rita Hayworth	Henry Schuck	Fred Astaire
Thursday, June 3, 2021	Greta Garbo	Claudette Colbert	Elizabeth Taylor	James Dean	Mary Pickford	Audrey Hepburn	Robert Mitchum	Jean Harlow	Joan Crawford	John Wayne	Burt Lancaster	Clark Gable	Barbara Stanwyck	Orson Welles	Judy Garland	Gene Kelly	James Stewart	Lillian Gish	Shirley Temple	Bette Davis	Fred Astaire

The Full Grid Sheet

This is one sample report showing all the dates on the left and all the employees across the top. We are purposely not showing the Office/Loc and Shift on this report (but there will be enough S's on each row to cover all named Offices and their respective Shifts).

The very top row is a count of how many times this employee has been scheduled to work.

Here are the possible values in this grid and their meaning.

- blank - A blank means the employee was not scheduled to work this date. It could be because they were not up in the rotation of assignments or because they had an Office and/or Shift restriction which we cannot show here.
- IW - Include Weekday. A restriction based on "Only Schedule Restriction" on the Names sheet.
- XW - Exclude Weekday. A restriction based on "Never Schedule Restriction" on the Names sheet.
- XD - Exclude Date. A date restriction based on "Never Schedule Restriction" on the Names sheet.
- S - This employee is scheduled to work on this date.

The date column will change to red if fewer than (inoffice) employees were able to be scheduled on that date. This would be due to scheduling restrictions.

The following example shows a scheduling pattern produced by the default setting of blank in the (method) option.

Total Assignments --->		11	8	18	15	48	24	10	6	25	48	34	27	24	48	20	22	0	29	2	29	0	4	30	0	17	27	28
		Audrey Hepburn	Ava Gardner	Barbara Stanwyck	Bette Davis	Burt Lancaster	Buster Keaton	Carole Lombard	Cary Grant	Charlie Chaplin	Clark Gable	Claudette Colbert	Edward G. Robinson	Elizabeth Taylor	Fred Astaire	Gary Cooper	Gene Kelly	Ginger Rogers	Grace Kelly	Gregory Peck	Greta Garbo	Henry Fonda	Humphrey Bogart	Ingrid Bergman	James Cagney	James Dean	James Stewart	Jean Harlow
Weekday	Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Tuesday	6/1/2021		IW			S				S	S	S	S	S							XD		IW	S				
Wednesday	6/2/2021		IW		S	S	XW			S	S				S	S												
Thursday	6/3/2021	S	IW	S		S				S	S	S	S	S		XW	S		S		S		IW	S		S	S	S
Friday	6/4/2021															XW					S		IW	S		S	S	S
Monday	6/7/2021	XW			S	S	XD			S	S				S	S			S				IW					
Tuesday	6/8/2021	S	IW			S	S			S	S	S				S					S		IW	S		S		
Wednesday	6/9/2021		IW		S	S	XW				S				S	S	S		S									
Thursday	6/10/2021		IW	S			S			S		S		S		XW			S				IW					S
Friday	6/11/2021	S				S				S	S	S	S	S		XW							IW					
Monday	6/14/2021	XD	S		S	S				S	S	S			S	S	S						IW					
Tuesday	6/15/2021		IW			S				S	S	S	S	S	S	S			S				IW					
Wednesday	6/16/2021		IW				XW		S							S			S				S	S				
Thursday	6/17/2021		IW			S	S			S	S	S		S		XW	S		S				IW		S	S	S	
Friday	6/18/2021	S				S	S	S		S	S	S	S	S		XW					S		IW					
Monday	6/21/2021	XW	S			S			S	S	S					S			S		S		IW	S		S		
Tuesday	6/22/2021		IW				S			S		S				S				S			IW					
Wednesday	6/23/2021	S	IW	S		S	XW			S						S												
Thursday	6/24/2021		IW			S	S	S		S	S			S		XW	S				S		IW	S		S	S	
Friday	6/25/2021					S				S	S	S	S	S		XW	S						IW					
Monday	6/28/2021	XW	S												S	S							IW			S	S	S
Tuesday	6/29/2021		IW			S	S	S		S	S	S			S	S					XD		IW	S		S	S	S
Wednesday	6/30/2021		IW	S	XD	S	XW	S	S	S					S	S					XD			S		S		S
Thursday	7/1/2021		IW			S				S	S	S	S	S		XD	S		S		XD		IW					
Friday	7/2/2021	S					S									XW	S				XD		IW	S		S		
Tuesday	7/6/2021		IW	S		S				S	S		S	S							XD		IW					S

By contrast, here is an example using the option where (method) is set to 1. We also changed the number of employees to 30 and the option (restrictions) to Off. There are a few interesting things to note in this example:

- The date 5/18/2021 is shaded red because there were no employees without scheduling restrictions (already worked that day or repeat assignment threshold violated) that could have been chosen to fill one of the remaining work slots for that date, or the only employees left to choose from were of the wrong role.
- 3 employees have blank columns because I left their role set to "Team Lead" in the Names sheet, but I did not define the "Team Lead" role in the Options sheet.

Total Assignments --->		45	48	46	43	63	49	46	48	48	63	50	49	47	63	48	47	0	50	49	46	0	46	46	0	47	48	47	47	47	46
Weekday / Work Restrictions Off	Date	Audrey Hepburn	Ava Gardner	Barbara Stanwyck	Bette Davis	Burt Lancaster	Buster Keaton	Carole Lombard	Cary Grant	Charlie Chaplin	Clark Gable	Claudette Colbert	Edward G. Robinson	Elizabeth Taylor	Fred Astaire	Gary Cooper	Gene Kelly	Ginger Rogers	Grace Kelly	Gregory Peck	Greta Garbo	Henry Fonda	Humphrey Bogart	Ingrid Bergman	James Cagney	James Dean	James Stewart	Jean Harlow	Joan Crawford	John Wayne	Judy Garland
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Monday	5/17/2021		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S		S	S	S		S	S		S					
Tuesday	5/18/2021	S	S	S		S	S	S	S	S	S	S	S	S	S									S		S	S	S	S	S	S
Wednesday	5/19/2021	S	S	S	S	S	S	S	S		S				S	S	S		S	S	S		S			S	S	S	S	S	S
Thursday	5/20/2021	S				S			S	S	S	S	S	S	S	S	S		S	S	S		S	S		S	S	S	S	S	S
Friday	5/21/2021		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S		S	S	S		S	S		S					
Monday	5/24/2021	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S										S	S	S	S	S
Tuesday	5/25/2021	S	S	S	S	S	S	S	S		S				S				S	S	S		S	S		S	S	S	S	S	S
Wednesday	5/26/2021	S				S				S	S	S	S	S	S	S	S		S	S	S		S	S		S	S	S	S	S	S
Thursday	5/27/2021		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S		S							S	S	S	S	S	
Friday	5/28/2021	S	S	S	S	S				S					S	S	S		S	S	S		S	S		S	S	S	S	S	S
Tuesday	6/1/2021		S	S	S	S	S	S	S	S	S	S	S	S	S					S	S		S	S		S	S	S	S		
Wednesday	6/2/2021	S	S			S			S	S	S	S	S	S	S	S	S		S	S	S		S	S		S				S	S
Thursday	6/3/2021	S	S			S	S	S	S	S	S	S	S		S	S	S		S								S	S	S	S	S
Friday	6/4/2021	S	S	S	S	S				S	S	S		S	S	S	S			S	S		S	S		S	S	S	S	S	S
Monday	6/7/2021	S				S		S	S	S	S		S		S	S	S		S	S	S		S	S		S	S	S	S	S	S
Tuesday	6/8/2021		S	S	S	S	S	S	S	S	S	S	S	S	S	S			S	S			S	S		S	S				
Wednesday	6/9/2021	S	S			S				S	S	S	S	S	S	S			S	S	S		S	S		S	S	S	S	S	S
Thursday	6/10/2021	S	S	S	S	S	S	S	S	S					S		S		S	S	S		S	S		S	S			S	S
Friday	6/11/2021		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S		S	S	S		S						S	S	
Monday	6/14/2021	S	S	S	S	S	S	S	S	S	S	S	S	S	S											S	S	S	S	S	S
Tuesday	6/15/2021	S	S			S	S	S	S	S	S	S	S		S	S	S		S	S	S		S	S		S	S	S	S		
Wednesday	6/16/2021	S		S	S	S				S	S	S	S	S	S	S	S		S	S	S		S	S		S	S	S		S	S
Thursday	6/17/2021	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S		S	S									S	S	S
Friday	6/18/2021					S	S	S	S	S	S	S	S	S	S	S			S	S	S		S	S		S	S	S	S	S	
Monday	6/21/2021	S	S	S	S	S	S				S				S	S	S		S	S	S		S	S		S	S	S	S	S	S

One last example where we go back to 70 employees and change (method) to 3. Here we pick every third employee if they are eligible. Three people have a solid column, being assigned every day. This is because they are marked as the role Mgr, and the options page was set up calling for 3 people with the Mgr role each day across 2 Office/Locs. This gives you an example of how changing the assignment (method) option produces different patterns of when people are chosen to work.

Total Assignments --->		13	19	12	13	63	26	25	19	19	63	26	19	19	63	25	19	0	26	19	20	0	25	19	0	25	24	19	19	17	19
	Work Restrictions Off	Audrey Hepburn	Ava Gardner	Barbara Stanwyck	Bette Davis	Burt Lancaster	Buster Keaton	Carole Lombard	Cary Grant	Charlie Chaplin	Clark Gable	Claudette Colbert	Edward G. Robinson	Elizabeth Taylor	Fred Astaire	Gary Cooper	Gene Kelly	Ginger Rogers	Grace Kelly	Gregory Peck	Greta Garbo	Henry Fonda	Humphrey Bogart	Ingrid Bergman	James Cagney	James Dean	James Stewart	Jean Harlow	Joan Crawford	John Wayne	Judy Garland
Weekday	Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Monday	5/17/2021					S	S			S	S		S		S	S			S					S		S		S			S
Tuesday	5/18/2021		S			S	S		S	S	S				S				S		S			S		S					
Wednesday	5/19/2021	S		S	S		S			S	S			S	S		S			S										S	
Thursday	5/20/2021		S		S			S		S	S		S		S								S			S		S			S
Friday	5/21/2021	S			S	S				S					S	S			S		S			S		S				S	
Monday	5/24/2021		S			S		S		S	S	S	S	S		S			S					S		S				S	
Tuesday	5/25/2021			S		S	S		S	S	S				S	S			S					S							
Wednesday	5/26/2021		S			S		S	S	S	S				S		S												S		S
Thursday	5/27/2021	S		S	S			S		S					S						S					S	S			S	
Friday	5/28/2021					S				S			S	S					S	S							S	S			S
Tuesday	6/1/2021					S	S		S	S	S	S			S				S					S		S		S			S
Wednesday	6/2/2021		S			S	S			S	S				S	S			S		S			S				S			
Thursday	6/3/2021	S		S	S			S		S	S				S	S					S									S	
Friday	6/4/2021			S		S		S		S		S			S								S			S	S			S	S
Monday	6/7/2021		S			S				S					S	S			S				S	S		S				S	
Tuesday	6/8/2021					S		S	S	S	S	S			S	S					S			S		S				S	
Wednesday	6/9/2021			S		S	S		S	S	S				S	S			S							S					
Thursday	6/10/2021		S			S		S	S	S	S				S		S										S		S		S
Friday	6/11/2021	S		S	S			S		S					S					S						S		S			S
Monday	6/14/2021					S				S			S	S		S	S		S	S							S		S	S	
Tuesday	6/15/2021				S	S			S	S			S	S	S	S				S			S			S			S	S	
Wednesday	6/16/2021		S			S	S		S	S	S				S	S			S		S			S		S					
Thursday	6/17/2021	S		S	S			S		S	S		S	S	S		S				S									S	
Friday	6/18/2021		S			S		S		S	S		S		S								S			S		S	S		S
Monday	6/21/2021		S			S	S			S					S	S			S				S	S		S		S			

The Where (When) Sheet

This sheet denotes if the employee has a scheduling restriction based on (where) (e.g., Office/Loc) or (when) (e.g., Shift). This is based on the scheduling restrictions coding you did on the Names sheet.

Here are the possible values in this grid.

- blank - A blank means no scheduling restriction is in place.
- IT - Include Time. A Shift restriction based on "Only Schedule Restriction" on the Names sheet.
- XT - Exclude Time. A Shift restriction based on "Never Schedule Restriction" on the Names sheet.
- IL - Include Loc. An Office/Loc restriction based on "Only Schedule Restriction" on the Names sheet.
- XL - Exclude Loc. An Office/Loc restriction based on "Never Schedule Restriction" on the Names sheet.

Examples:

- If you coded "Never work at Office called Main" there would be an XL for the rows with Office Main.
- If you coded "Only work at Office called Main" there would be an IL for each Office that is not Main.
- If you coded "Never work Shift 2" there would be an XT for the rows with Shift 2.
- If you coded "Only work Shift 2" there would be an IT for each row that is not Shift 2.

You can of course code something like "Only work Main, s2" meaning you only want the employee to work at the Office called Main on shift 2.

	Audrey Hepburn	Ava Gardner	Barbara Stanwyck	Bette Davis	Burt Lancaster	Buster Keaton	Carole Lombard	Cary Grant	Charlie Chaplin	Clark Gable	Claudette Colbert	Edward G. Robinson	Elizabeth Taylor	Fred Astaire	Gary Cooper	Gene Kelly	Ginger Rogers	Grace Kelly	Gregory Peck	Greta Garbo	Henry Fonda	Humphrey Bogart	Ingrid Bergman	James Cagney	James Dean	James Stewart	Jean Harlow	Joan Crawford	John Wayne	Judy Garland
Office/Loc(Shift)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Main (s1)																IL			IT			IT				XL				
Spring St. (s2)							IL	IT			XT														IT	XT		IL		
Uptown (s3)							IL	IT			XL								IT						IT			IL		

The Bad Dates Sheet

This sheet denotes if the employee has a scheduling restriction based on date. This is based on the scheduling restrictions coding you did on the Names sheet.

Here are the possible values in this grid.

- blank - A blank means no scheduling restriction is in place related to the weekday or actual date.
- IW - Include Weekday. A weekday restriction based on "Only Schedule Restriction" on the Names sheet.
- XW - Exclude Weekday. A weekday restriction based on "Never Schedule Restriction" on the Names sheet.
- XD - Exclude Date. A date restriction based on "Never Schedule Restriction" on the Names sheet.

Examples:

- If you coded "Never work Friday" there would be an XW every Friday.
- If you coded "Only work Friday" there would be an IW for each day except Friday.
- If you coded "Never work 4/29/2021" there would be an XD on 4/29/2021.
- If you coded "Vacation from 5/1/2021-5/10/2021" there would be an XD on all those dates.

Weekday	Date	Audrey Hepburn (1)	Ava Gardner (2)	Barbara Stanwyck (3)	Bette Davis (4)	Burt Lancaster (5)	Buster Keaton (6)	Carole Lombard (7)	Cary Grant (8)	Charlie Chaplin (9)	Clark Gable (10)	Claudette Colbert (11)	Edward G. Robinson (12)	Elizabeth Taylor (13)	Fred Astaire (14)	Gary Cooper (15)	Gene Kelly (16)	Ginger Rogers (17)	Grace Kelly (18)	Gregory Peck (19)	Greta Garbo (20)	Henry Fonda (21)	Humphrey Bogart (22)	Ingrid Bergman (23)	James Cagney (24)	James Dean (25)	James Stewart (26)	Jean Harlow (27)	Joan Crawford (28)	John Wayne (29)	Judy Garland (30)
Monday	5/17/2021	XW																					IW						IW		
Tuesday	5/18/2021		IW																				IW						IW		
Wednesday	5/19/2021		IW				XW																						IW		
Thursday	5/20/2021		IW													XW							IW								
Friday	5/21/2021															XW							IW						IW		
Monday	5/24/2021	XW																					IW						IW		
Tuesday	5/25/2021		IW																		XD		IW								
Wednesday	5/26/2021		IW				XW														XD								IW		
Thursday	5/27/2021		IW													XW					XD		IW								
Friday	5/28/2021															XW					XD								IW		
Tuesday	6/1/2021		IW																		XD		IW						IW		
Wednesday	6/2/2021		IW				XW																						IW		
Thursday	6/3/2021		IW													XW							IW								
Friday	6/4/2021															XW							IW						IW		
Monday	6/7/2021	XW					XD																IW						IW		
Tuesday	6/8/2021		IW																				IW						IW		
Wednesday	6/9/2021		IW				XW																						IW		
Thursday	6/10/2021		IW													XW							IW								
Friday	6/11/2021															XW							IW						IW		
Monday	6/14/2021	XD																					IW						IW		
Tuesday	6/15/2021		IW																				IW						IW		
Wednesday	6/16/2021		IW				XW																						IW		
Thursday	6/17/2021		IW													XW							IW								
Friday	6/18/2021															XW							IW						IW		
Monday	6/21/2021	XW																					IW						IW		
Tuesday	6/22/2021		IW																				IW						IW		
Wednesday	6/23/2021		IW				XW																						IW		

The Calendar Sheet

This sheet holds a series of monthly calendars spanning one year into the future from the start date. You choose the content that appears on these calendars via the (caldisplay) option on the Options sheet.

May 2021

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17 — Main (s1): Ingrid Bergman, Shantanu Narayen, Grace Kelly, Gary Cooper, Ian Siegel, Carole Lombard, Ava Gardner, Rita Hayworth, Lynn Jurich, Brian Halligan, Mgr:Burt Lancaster, Mgr:Clark Gable	18 — Main (s1): Jean Harlow, Laurence Olivier, Greta Garbo, Dan Rosensweig, Satya Nadella, Eric Yuan, James Dean, Marx Brothers, Lillian Gish, Buster Keaton, Mgr:Burt Lancaster, Mgr:Clark Gable	19 — Main (s1): Katharine Hepburn, Gary Cooper, William Holden, Ryan Smith, Lynn Jurich, Lillian Gish, Manny Medina, Satya Nadella, Annette Brüls, Grace Kelly, Mgr:Burt Lancaster, Mgr:Clark Gable	20 — Main (s1): Greta Garbo, Sundar Pichai, James Dean, Laurence Olivier, Joan Crawford, Audrey Hepburn, Katharine Hepburn, Marilyn Monroe, Lauren Bacall, Timothy Cook, Mgr:Burt Lancaster, Mgr:Clark Gable	21 — Main (s1): Bert Bean, Lauren Bacall, Timothy Cook, Grace Kelly, Ingrid Bergman, Carole Lombard, Spencer Tracy, Barbara Stanwyck, Edward G. Robinson, Cary Grant, Mgr:Burt Lancaster, Mgr:Clark Gable	22
23	24 — Main (s1): William Holden, Lynn Jurich, Manny Medina, Annette Brüls, Judy Garland, Ava Gardner, Kirk Douglas, Brian Halligan, Patrick Pacious, Robert Frist, Mgr:Burt Lancaster, Mgr:Clark Gable	25 — Main (s1): Eric Yuan, Mary Pickford, Ingrid Bergman, Patrick Pacious, James Dean, Vivien Leigh, Shantanu Narayen, Buster Keaton, Carole Lombard, Audrey Hepburn, Mgr:Burt Lancaster, Mgr:Clark Gable	26 — Main (s1): Cary Grant, Annette Brüls, James Dean, Ian Siegel, Grace Kelly, Orson Welles, Lynn Jurich, Charlie Chaplin, Claudette Colbert, Elizabeth Taylor, Mgr:Burt Lancaster, Mgr:Clark Gable	27 — Main (s1): Jean Harlow, Buster Keaton, Bert Bean, Joan Crawford, Sundar Pichai, Lillian Gish, Timothy Cook, Judy Garland, Brian Halligan, Barbara Stanwyck, Mgr:Burt Lancaster, Mgr:Clark Gable	28 — Main (s1): Jean Harlow, Katharine Hepburn, Kirk Douglas, Lauren Bacall, Ingrid Bergman, Grace Kelly, Carole Lombard, Shantanu Narayen, Dan Rosensweig, Marx Brothers, Mgr:Burt Lancaster, Mgr:Clark Gable	29
30	31 — Memorial Day					

The Cal Content Sheet

The (caldisplay) option on the Options sheet determines which set of employees will be displayed on the Calendar sheet. You can choose any of the possible Office (Shift) selections.

Note: when you change the selector, the number of employees working each day changes and therefore the space taken inside each calendar grid changes. If you are not able to see all the employee names on the Calendar, click in the upper left corner of the Calendar sheet to highlight all rows and columns and then click the "Wrap Text" button in the alignment section of the ribbon (twice). Once turns wrapping off and the 2nd time turns it back on. That should resize each calendar grid cell and all the names should now be visible. (Sorry, there is no way for me to do this for you without a macro).

Date	Holiday	Display on Calendar	row	Main (s1)	Spring St. (s2)	Uptown (s3)
					13	16
Monday, May 17, 2021		Main (s1): Ingrid Bergman, Shantanu Naraye	1	Main (s1): Ingrid Bergm:	Spring St. (s2): John Wayr	Uptown (s3): Sundar Pich
Tuesday, May 18, 2021		Main (s1): Jean Harlow, Laurence Olivier, Gre	2	Main (s1): Jean Harlow,	Spring St. (s2): Vlad Shmu	Uptown (s3): Charlie Chap
Wednesday, May 19, 2021		Main (s1): Katharine Hepburn, Gary Cooper,	3	Main (s1): Katharine He	Spring St. (s2): Vlad Shmu	Uptown (s3): Gene Kelly,
Thursday, May 20, 2021		Main (s1): Greta Garbo, Sundar Pichai, James	4	Main (s1): Greta Garbo,	Spring St. (s2): Gene Kelly	Uptown (s3): Edward G. F
Friday, May 21, 2021		Main (s1): Bert Bean, Lauren Bacall, Timothy	5	Main (s1): Bert Bean, La	Spring St. (s2): John Wayr	Uptown (s3): Sophia Lore
Saturday, May 22, 2021						
Sunday, May 23, 2021						
Monday, May 24, 2021		Main (s1): William Holden, Lynn Jurich, Man	6	Main (s1): William Hold	Spring St. (s2): Vlad Shmu	Uptown (s3): Ryan Smith,
Tuesday, May 25, 2021		Main (s1): Eric Yuan, Mary Pickford, Ingrid Be	7	Main (s1): Eric Yuan, Ma	Spring St. (s2): Vlad Shmu	Uptown (s3): Charlie Chap
Wednesday, May 26, 2021		Main (s1): Cary Grant, Annette Brüls, James	8	Main (s1): Cary Grant, A	Spring St. (s2): Rita Hayw	Uptown (s3): Humphrey E
Thursday, May 27, 2021		Main (s1): Jean Harlow, Buster Keaton, Bert	9	Main (s1): Jean Harlow,	Spring St. (s2): Orson Wel	Uptown (s3): Shirley Tem
Friday, May 28, 2021		Main (s1): Jean Harlow, Katharine Hepburn,	10	Main (s1): Jean Harlow,	Spring St. (s2): Eric Yuan,	Uptown (s3): Daniel Dines
Saturday, May 29, 2021						
Sunday, May 30, 2021						
Monday, May 31, 2021	Memorial Day	Memorial Day				
Tuesday, June 1, 2021		Main (s1): Edward G. Robinson, Mitch Snyde	11	Main (s1): Edward G. Rc	Spring St. (s2): Judy Garla	Uptown (s3): Patrick Pacic
Wednesday, June 2, 2021		Main (s1): Annette Brüls, Ryan Smith, Gary C	12	Main (s1): Annette Brüls	Spring St. (s2): Marilyn M	Uptown (s3): Mary Pickfo
Thursday, June 3, 2021		Main (s1): Greta Garbo, Claudette Colbert, E	13	Main (s1): Greta Garbo,	Spring St. (s2): Barbara St	Uptown (s3): Gene Kelly,
Friday, June 4, 2021		Main (s1): Shirley Temple, Jean Harlow, Gret	14	Main (s1): Shirley Templ	Spring St. (s2): Vivien Leig	Uptown (s3): Marx Broth
Saturday, June 5, 2021						
Sunday, June 6, 2021						
Monday, June 7, 2021		Main (s1): Robert Frist, Sidney Poitier, Sophia	15	Main (s1): Robert Frist,	Spring St. (s2): Henry Sch	Uptown (s3): Charlie Chap
Tuesday, June 8, 2021		Main (s1): Buster Keaton, Ingrid Bergman, Da	16	Main (s1): Buster Keator	Spring St. (s2): Mae West	Uptown (s3): Katharine H
Wednesday, June 9, 2021		Main (s1): Robert Mitchum, Marilyn Monroe	17	Main (s1): Robert Mitch	Spring St. (s2): Audrey He	Uptown (s3): Ryan Smith,
Thursday, June 10, 2021		Main (s1): Jean Harlow, Claudette Colbert, G	18	Main (s1): Jean Harlow,	Spring St. (s2): Elizabeth 1	Uptown (s3): Brian Halliga
Friday, June 11, 2021		Main (s1): Edward G. Robinson, Sundar Picha	19	Main (s1): Edward G. Rc	Spring St. (s2): Orson Wel	Uptown (s3): Marx Broth
Saturday, June 12, 2021						
Sunday, June 13, 2021						

The Export Google Sheet

This sheet is used to export data to a xxx.csv file that can then be used to import into a shared Google Calendar. You can ask all your employees to check this shared calendar for the work schedule.

Do a File - Save As and change the type to: **CSV (Comma delimited) (*.csv)**

You can make the filename whatever you want. Then go to your google calendar on the web and create a new calendar. Using the settings icon for that calendar, you can import this csv file. If you change the schedule and want to republish it, just delete the old calendar, and create a new one, then import the new csv file.

I suggest you not import these events to your main Google Calendar because it is impossible to bulk delete all events. It is best to import to alternate calendars that can easily be deleted and recreated.

Subject	Start Date	Start Time	End Date	End Time	All Day Event	Description	Location	Private
Scheduling-123: Main (s1)	6/1/2021	6:00:00 AM	6/1/2021	2:00:00 PM	FALSE	Main (s1): Edward G. Robinson, Mitch Snyder, Spenc	Main (s1)	FALSE
Scheduling-123: Spring St. (s2)	6/1/2021	2:00:00 PM	6/1/2021	10:00:00 PM	FALSE	Spring St. (s2): John Wayne, Claudette Colbert, Timo	Spring St. (s2)	FALSE
Scheduling-123: Uptown (s3)	6/1/2021	10:00:00 PM	6/2/2021	6:00:00 AM	FALSE	Uptown (s3): Patrick Pacious, Robert Frist, Vlad Shm	Uptown (s3)	FALSE
Scheduling-123: Main (s1)	6/2/2021	6:00:00 AM	6/2/2021	2:00:00 PM	FALSE	Main (s1): Annette Brüls, Robert Frist, Gary Cooper,	Main (s1)	FALSE
Scheduling-123: Spring St. (s2)	6/2/2021	2:00:00 PM	6/2/2021	10:00:00 PM	FALSE	Spring St. (s2): Lillian Gish, Bette Davis, Bert Bean	Spring St. (s2)	FALSE
Scheduling-123: Uptown (s3)	6/2/2021	10:00:00 PM	6/3/2021	6:00:00 AM	FALSE	Uptown (s3): Marilyn Monroe, Katharine Hepburn, K	Uptown (s3)	FALSE
Scheduling-123: Main (s1)	6/3/2021	6:00:00 AM	6/3/2021	2:00:00 PM	FALSE	Main (s1): Greta Garbo, Claudette Colbert, Edward G	Main (s1)	FALSE
Scheduling-123: Spring St. (s2)	6/3/2021	2:00:00 PM	6/3/2021	10:00:00 PM	FALSE	Spring St. (s2): Audrey Hepburn, Orson Welles, Jean	Spring St. (s2)	FALSE
Scheduling-123: Uptown (s3)	6/3/2021	10:00:00 PM	6/4/2021	6:00:00 AM	FALSE	Uptown (s3): Gene Kelly, James Stewart, John Wayne	Uptown (s3)	FALSE
Scheduling-123: Main (s1)	6/4/2021	6:00:00 AM	6/4/2021	2:00:00 PM	FALSE	Main (s1): Shirley Temple, Jean Harlow, Greta Garbo	Main (s1)	FALSE
Scheduling-123: Spring St. (s2)	6/4/2021	2:00:00 PM	6/4/2021	10:00:00 PM	FALSE	Spring St. (s2): Vivien Leigh, Laurence Olivier, Kathar	Spring St. (s2)	FALSE
Scheduling-123: Uptown (s3)	6/4/2021	10:00:00 PM	6/5/2021	6:00:00 AM	FALSE	Uptown (s3): Marx Brothers, Manny Medina, James	Uptown (s3)	FALSE
Scheduling-123: Main (s1)	6/7/2021	6:00:00 AM	6/7/2021	2:00:00 PM	FALSE	Main (s1): Robert Frist, Sidney Poitier, Sophia Loren,	Main (s1)	FALSE
Scheduling-123: Spring St. (s2)	6/7/2021	2:00:00 PM	6/7/2021	10:00:00 PM	FALSE	Spring St. (s2): Eric Yuan, Robert Mitchum, William H	Spring St. (s2)	FALSE
Scheduling-123: Uptown (s3)	6/7/2021	10:00:00 PM	6/8/2021	6:00:00 AM	FALSE	Uptown (s3): Charlie Chaplin, Spencer Tracy, Marilyn	Uptown (s3)	FALSE
Scheduling-123: Main (s1)	6/8/2021	6:00:00 AM	6/8/2021	2:00:00 PM	FALSE	Main (s1): Buster Keaton, Greta Garbo, Daniel Dines	Main (s1)	FALSE
Scheduling-123: Spring St. (s2)	6/8/2021	2:00:00 PM	6/8/2021	10:00:00 PM	FALSE	Spring St. (s2): Lillian Gish, Claudette Colbert, Charlie	Spring St. (s2)	FALSE
Scheduling-123: Uptown (s3)	6/8/2021	10:00:00 PM	6/9/2021	6:00:00 AM	FALSE	Uptown (s3): James Stewart, Henry Schuck, Orson W	Uptown (s3)	FALSE
Scheduling-123: Main (s1)	6/9/2021	6:00:00 AM	6/9/2021	2:00:00 PM	FALSE	Main (s1): Robert Mitchum, Mae West, William Hold	Main (s1)	FALSE
Scheduling-123: Spring St. (s2)	6/9/2021	2:00:00 PM	6/9/2021	10:00:00 PM	FALSE	Spring St. (s2): Vlad Shmunis, Sophia Loren, Shirley T	Spring St. (s2)	FALSE
Scheduling-123: Uptown (s3)	6/9/2021	10:00:00 PM	6/10/2021	6:00:00 AM	FALSE	Uptown (s3): Ryan Smith, Marlene Dietrich, Katharin	Uptown (s3)	FALSE
Scheduling-123: Main (s1)	6/10/2021	6:00:00 AM	6/10/2021	2:00:00 PM	FALSE	Main (s1): Jean Harlow, Claudette Colbert, Grace Kel	Main (s1)	FALSE
Scheduling-123: Spring St. (s2)	6/10/2021	2:00:00 PM	6/10/2021	10:00:00 PM	FALSE	Spring St. (s2): Charlie Chaplin, Sundar Pichai, Elizabe	Spring St. (s2)	FALSE
Scheduling-123: Uptown (s3)	6/10/2021	10:00:00 PM	6/11/2021	6:00:00 AM	FALSE	Uptown (s3): Bert Bean, Shirley Temple, Patrick Paci	Uptown (s3)	FALSE
Scheduling-123: Main (s1)	6/11/2021	6:00:00 AM	6/11/2021	2:00:00 PM	FALSE	Main (s1): Claudette Colbert, Sundar Pichai, Edward	Main (s1)	FALSE
Scheduling-123: Spring St. (s2)	6/11/2021	2:00:00 PM	6/11/2021	10:00:00 PM	FALSE	Spring St. (s2): Orson Welles, Mitch Snyder, Marlene	Spring St. (s2)	FALSE
Scheduling-123: Uptown (s3)	6/11/2021	10:00:00 PM	6/12/2021	6:00:00 AM	FALSE	Uptown (s3): Marx Brothers, Audrey Hepburn, Dan F	Uptown (s3)	FALSE
Scheduling-123: Main (s1)	6/14/2021	6:00:00 AM	6/14/2021	2:00:00 PM	FALSE	Main (s1): Ava Gardner, Bette Davis, Marlon Brando	Main (s1)	FALSE
Scheduling-123: Spring St. (s2)	6/14/2021	2:00:00 PM	6/14/2021	10:00:00 PM	FALSE	Spring St. (s2): Vivien Leigh, Gene Kelly, Gary Cooper	Spring St. (s2)	FALSE

The Export Outlook Sheet

This sheet is used to export data to a xxx.csv file that can then be used to import into a shared Microsoft Outlook Calendar. You can ask all your employees to check this shared calendar for the work schedule.

Do a File - Save As and change the type to: **CSV (Comma delimited) (*.csv)**

You can make the filename whatever you want. Then go to the place in Outlook where you can Import events to the calendar and reference this saved file.

Subject	Location	Start Time	Start Date	End Time	End Date	Description	Private
Scheduling-123: Main (s1)	Main (s1)	6:00:00 AM	6/1/2021	2:00:00 PM	6/1/2021	Main (s1): Edward G. Robinson, Mitch Snyder, Spen	No
Scheduling-123: Spring St. (s2)	Spring St. (s2)	2:00:00 PM	6/1/2021	10:00:00 PM	6/1/2021	Spring St. (s2): John Wayne, Claudette Colbert, Time	No
Scheduling-123: Uptown (s3)	Uptown (s3)	10:00:00 PM	6/1/2021	6:00:00 AM	6/2/2021	Uptown (s3): Patrick Pacious, Robert Frist, Vlad Shm	No
Scheduling-123: Main (s1)	Main (s1)	6:00:00 AM	6/2/2021	2:00:00 PM	6/2/2021	Main (s1): Annette Brüls, Robert Frist, Gary Cooper,	No
Scheduling-123: Spring St. (s2)	Spring St. (s2)	2:00:00 PM	6/2/2021	10:00:00 PM	6/2/2021	Spring St. (s2): Lillian Gish, Bette Davis, Bert Bean	No
Scheduling-123: Uptown (s3)	Uptown (s3)	10:00:00 PM	6/2/2021	6:00:00 AM	6/3/2021	Uptown (s3): Marilyn Monroe, Katharine Hepburn,	No
Scheduling-123: Main (s1)	Main (s1)	6:00:00 AM	6/3/2021	2:00:00 PM	6/3/2021	Main (s1): Greta Garbo, Claudette Colbert, Edward (	No
Scheduling-123: Spring St. (s2)	Spring St. (s2)	2:00:00 PM	6/3/2021	10:00:00 PM	6/3/2021	Spring St. (s2): Audrey Hepburn, Orson Welles, Jean	No
Scheduling-123: Uptown (s3)	Uptown (s3)	10:00:00 PM	6/3/2021	6:00:00 AM	6/4/2021	Uptown (s3): Gene Kelly, James Stewart, John Wayn	No
Scheduling-123: Main (s1)	Main (s1)	6:00:00 AM	6/4/2021	2:00:00 PM	6/4/2021	Main (s1): Shirley Temple, Jean Harlow, Greta Garbo	No
Scheduling-123: Spring St. (s2)	Spring St. (s2)	2:00:00 PM	6/4/2021	10:00:00 PM	6/4/2021	Spring St. (s2): Vivien Leigh, Laurence Olivier, Kathar	No
Scheduling-123: Uptown (s3)	Uptown (s3)	10:00:00 PM	6/4/2021	6:00:00 AM	6/5/2021	Uptown (s3): Marx Brothers, Manny Medina, James	No
Scheduling-123: Main (s1)	Main (s1)	6:00:00 AM	6/7/2021	2:00:00 PM	6/7/2021	Main (s1): Robert Frist, Sidney Poitier, Sophia Loren	No
Scheduling-123: Spring St. (s2)	Spring St. (s2)	2:00:00 PM	6/7/2021	10:00:00 PM	6/7/2021	Spring St. (s2): Eric Yuan, Robert Mitchum, William H	No
Scheduling-123: Uptown (s3)	Uptown (s3)	10:00:00 PM	6/7/2021	6:00:00 AM	6/8/2021	Uptown (s3): Charlie Chaplin, Spencer Tracy, Marily	No
Scheduling-123: Main (s1)	Main (s1)	6:00:00 AM	6/8/2021	2:00:00 PM	6/8/2021	Main (s1): Buster Keaton, Greta Garbo, Daniel Dines	No
Scheduling-123: Spring St. (s2)	Spring St. (s2)	2:00:00 PM	6/8/2021	10:00:00 PM	6/8/2021	Spring St. (s2): Lillian Gish, Claudette Colbert, Charli	No
Scheduling-123: Uptown (s3)	Uptown (s3)	10:00:00 PM	6/8/2021	6:00:00 AM	6/9/2021	Uptown (s3): James Stewart, Henry Schuck, Orson V	No
Scheduling-123: Main (s1)	Main (s1)	6:00:00 AM	6/9/2021	2:00:00 PM	6/9/2021	Main (s1): Robert Mitchum, Mae West, William Hol	No
Scheduling-123: Spring St. (s2)	Spring St. (s2)	2:00:00 PM	6/9/2021	10:00:00 PM	6/9/2021	Spring St. (s2): Vlad Shmunis, Sophia Loren, Shirley	No
Scheduling-123: Uptown (s3)	Uptown (s3)	10:00:00 PM	6/9/2021	6:00:00 AM	6/10/2021	Uptown (s3): Ryan Smith, Marlene Dietrich, Kathari	No
Scheduling-123: Main (s1)	Main (s1)	6:00:00 AM	6/10/2021	2:00:00 PM	6/10/2021	Main (s1): Jean Harlow, Claudette Colbert, Grace Ke	No
Scheduling-123: Spring St. (s2)	Spring St. (s2)	2:00:00 PM	6/10/2021	10:00:00 PM	6/10/2021	Spring St. (s2): Charlie Chaplin, Sundar Pichai, Elizab	No
Scheduling-123: Uptown (s3)	Uptown (s3)	10:00:00 PM	6/10/2021	6:00:00 AM	6/11/2021	Uptown (s3): Bert Bean, Shirley Temple, Patrick Paci	No
Scheduling-123: Main (s1)	Main (s1)	6:00:00 AM	6/11/2021	2:00:00 PM	6/11/2021	Main (s1): Claudette Colbert, Sundar Pichai, Edward	No
Scheduling-123: Spring St. (s2)	Spring St. (s2)	2:00:00 PM	6/11/2021	10:00:00 PM	6/11/2021	Spring St. (s2): Orson Welles, Mitch Snyder, Marlene	No
Scheduling-123: Uptown (s3)	Uptown (s3)	10:00:00 PM	6/11/2021	6:00:00 AM	6/12/2021	Uptown (s3): Marx Brothers, Audrey Hepburn, Dan	No
Scheduling-123: Main (s1)	Main (s1)	6:00:00 AM	6/14/2021	2:00:00 PM	6/14/2021	Main (s1): Ava Gardner, Bette Davis, Marlon Brando	No
Scheduling-123: Spring St. (s2)	Spring St. (s2)	2:00:00 PM	6/14/2021	10:00:00 PM	6/14/2021	Spring St. (s2): Vivien Leigh, Gene Kelly, Gary Coope	No

The Never Worked Together Sheet

This sheet highlights each employee pair that have never been scheduled to work together on the same date. If you see a given employee with a lot of x's it is most likely due to the scheduling restrictions in place for that employee. Try turning (restrictions) to Off on the Options page to see how this reduces. Or you can set (endsched) on the Options page to a date further out in time to give more opportunities for employees to be paired together.

ID	Employee Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
		Audrey Hepburn	Ava Gardner	Barbara Stanwyck	Bette Davis	Burt Lancaster	Buster Keaton	Carole Lombard	Cary Grant	Charlie Chaplin	Clark Gable	Claudette Colbert	Edward G. Robinson	Elizabeth Taylor	Fred Astaire	Gary Cooper	Gene Kelly	Ginger Rogers	Grace Kelly	Gregory Peck	Greta Garbo	Henry Fonda	Humphrey Bogart	Ingrid Bergman	James Cagney	James Dean	James Stewart	Jean Harlow	Joan Crawford	John Wayne	Judy Garland
1	Audrey Hepburn																	x		x		x			x						
2	Ava Gardner											x						x				x	x		x				x		
3	Barbara Stanwyck																	x				x			x						
4	Bette Davis																	x				x			x						
5	Burt Lancaster																	x				x			x						
6	Buster Keaton																	x				x	x		x						
7	Carole Lombard																	x				x	x		x				x		
8	Cary Grant																	x				x			x						
9	Charlie Chaplin																	x				x			x						
10	Clark Gable																	x				x			x						
11	Claudette Colbert		x															x				x			x						
12	Edward G. Robinson																	x				x	x		x						
13	Elizabeth Taylor																	x				x			x						
14	Fred Astaire																	x				x			x						
15	Gary Cooper																	x				x			x				x		
16	Gene Kelly																	x				x	x		x						
17	Ginger Rogers	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x
18	Grace Kelly																	x				x			x						
19	Gregory Peck	x																x				x			x						
20	Greta Garbo																	x				x			x						
21	Henry Fonda	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x
22	Humphrey Bogart		x				x	x					x				x	x				x			x			x	x		
23	Ingrid Bergman																	x				x			x						
24	James Cagney	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x
25	James Dean																	x				x			x						
26	James Stewart																	x				x			x						
27	Jean Harlow																	x				x	x		x						
28	Joan Crawford		x					x								x		x				x	x		x						
29	John Wayne																	x				x			x						
30	Judy Garland																	x				x			x						

The Worked Together Sheet

This sheet counts how many times the employee pair represented by the intersection have been scheduled to work together on the same date across the whole schedule. This is mostly used to feed the Never Worked Together sheet.

ID	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1		2	6	5	17	5	3	1	5	17	4	8	7	17	5	5	0	7	0	6	0	1	5	0	6	4	4	2	7	7
2	2		3	4	11	1	1	1	3	11	0	3	3	11	4	2	0	5	1	3	0	0	3	0	3	2	3	0	4	6
3	6	3		7	18	6	2	5	6	18	6	6	6	18	4	4	0	4	1	5	0	2	5	0	6	4	5	3	8	9
4	5	4	7		15	3	1	2	4	15	3	4	3	15	6	4	0	7	1	2	0	2	4	0	3	3	3	1	3	8
5	17	11	18	15		22	14	10	18	63	23	21	20	63	21	17	0	26	6	21	0	5	25	0	22	19	24	7	26	25
6	5	1	6	3	22		6	2	9	22	12	7	5	22	5	8	0	3	1	9	0	0	10	0	13	10	14	4	8	7
7	3	1	2	1	14	6		2	6	14	7	6	5	14	6	2	0	7	2	4	0	0	7	0	4	3	5	0	5	4
8	1	1	5	2	10	2	2		5	10	4	3	4	10	1	1	0	6	3	4	0	3	8	0	4	4	1	1	5	2
9	5	3	6	4	18	9	6	5		18	6	6	4	18	6	2	0	7	2	4	0	2	8	0	7	6	5	1	7	5
10	17	11	18	15	63	22	14	10	18		23	21	20	63	21	17	0	26	6	21	0	5	25	0	22	19	24	7	26	25
11	4	0	6	3	23	12	7	4	6	23		10	9	23	6	8	0	9	4	9	0	1	13	0	10	11	11	5	13	8
12	8	3	6	4	21	7	6	3	6	21	10		12	21	6	4	0	11	2	7	0	0	10	0	3	1	6	5	12	5
13	7	3	6	3	20	5	5	4	4	20	9	12		20	5	6	0	11	2	10	0	1	9	0	7	4	7	3	11	7
14	17	11	18	15	63	22	14	10	18	63	23	21	20		21	17	0	26	6	21	0	5	25	0	22	19	24	7	26	25
15	5	4	4	6	21	5	6	1	6	21	6	6	5	21		4	0	9	2	3	0	1	6	0	7	4	5	0	8	11
16	5	2	4	4	17	8	2	1	2	17	8	4	6	17	4		0	6	1	8	0	0	5	0	8	9	9	4	6	6
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
18	7	5	4	7	26	3	7	6	7	26	9	11	11	26	9	6	0		1	8	0	4	12	0	4	6	5	2	12	9
19	0	1	1	1	6	1	2	3	2	6	4	2	2	6	2	1	0	1		1	0	2	2	0	2	2	2	1	2	1
20	6	3	5	2	21	9	4	4	4	21	9	7	10	21	3	8	0	8	1		0	1	11	0	12	8	9	3	9	9
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0
22	1	0	2	2	5	0	0	3	2	5	1	0	1	5	1	0	0	4	2	1	0		1	0	1	2	0	0	2	4
23	5	3	5	4	25	10	7	8	8	25	13	10	9	25	6	5	0	12	2	11	0	1		0	9	8	9	2	9	9
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0
25	6	3	6	3	22	13	4	4	7	22	10	3	7	22	7	8	0	4	2	12	0	1	9	0		14	14	4	12	9
26	4	2	4	3	19	10	3	4	6	19	11	1	4	19	4	9	0	6	2	8	0	2	8	0	14		13	3	9	9
27	4	3	5	3	24	14	5	1	5	24	11	6	7	24	5	9	0	5	2	9	0	0	9	0	14	13		4	12	9
28	2	0	3	1	7	4	0	1	1	7	5	5	3	7	0	4	0	2	1	3	0	0	2	0	4	3	4		5	2
29	7	4	8	3	26	8	5	5	7	26	13	12	11	26	8	6	0	12	2	9	0	2	9	0	12	9	12	5		9
30	7	6	9	8	25	7	4	2	5	25	8	5	7	25	11	6	0	9	1	9	0	4	9	0	9	9	9	2	9	

Special Situations

How do you handle employee changes? (Termination, new hire, leave of absence, etc.)

This section is important if any employee changes occur due to perhaps an employee quitting, getting fired, taking a leave, or maybe a new employee joining the business.

- **New Hires:** The easiest is if a new employee hires on. Change the total employee count (employees) on the Options sheet. That will create the next employee ID on the Names sheet. e.g., if you changed the (employees) Option from 30 to 31, you would now see a new row at the bottom of the employee names table on the Names sheet for ID 31. Fill out their employee name and any scheduling restrictions they may have.
    - **Override No:** If you did not lock in the previous schedule using the Override sheet, you should now see employee 31 scheduled to work on certain days.
    - **Override Yes:** If you did lock in the previous schedule using the Override sheet then all work slots would have been previously assigned to employees 1-30 and this new employee will not get assigned. You have a few choices here. You can manually change the Override sheet and record employee ID 31 in place of previously scheduled employees. Or you can delete some or all the rows on the Override sheet causing those dates, office, shifts to be rescheduled. The hope here is that the auto-scheduling logic picks the new employee ID 31 for some of those assignments.
- **Removed Employees:** This is more complicated. Let us use the example where you have 30 employees, and the schedule has already been created and communicated. Assume the employee with ID 15 goes away. You should **NOT** change the (employees) Option from 30 to 29 because that will cause each named employee on the Names sheet to now get a new ID number. It is best if you just blank out the name for ID 15 on the Names sheet and set the role column to None. Setting the role to anything not defined as one of your valid roles in

your business has the net effect of never scheduling that employee ID. Ok, that takes care of the auto-scheduling logic never trying to schedule ID 15 again.

- o **Override No:** If you did not lock in the previous schedule using the Override sheet, you should now see a brand-new assignment schedule minus employee ID 15 in the mix.
- o **Override Yes:** If you did lock in the previous schedule using the Override sheet, then ID 15 will have been assigned certain work slots. You have a few choices here. You can manually change the Override sheet and record any other employee ID in places where ID 15 was previously scheduled. Or you can delete all of ID 15's rows on the Override sheet causing those dates, office, shifts to be rescheduled. The auto-scheduling logic will pick new employees for those assignments.
- **Remove and Replace:** If you removed an employee and later replaced them with a new hire... Staying with the example of ID 15 previously removed as described above, you can just reuse the ID 15 row on the Names sheet. Assign the new employee name and restrictions on the ID 15 row and change the role from None to one or more valid roles (or blank it if the new person is general Staff).
- **Downsizing:** If you downsize your business permanently and go from say 30 total employees to 25. Follow the Removed Employees guidance above for each of the 5 people you are removing from the business. When the previously communicated schedule expires or when you are just ready to redo the whole schedule do this:
  1. Delete all rows on the Override sheet.
  2. Change the (employees) Option on the Options sheet from 30 to 25.
  3. Sort or move the employee names, restrictions, and roles on the Names sheet so they align with ID's 1-25. They do not need to align with the previous ID numbers; you just need to fill in the data for ID's 1-25. They will all be assigned on the new schedule.

Using multiple copies of the Scheduling-123 tool

You can copy this excel file and make 2 or 3 differently named copies. Each can be configured different from the others. Or they can all be configured the same way except for the date span of the schedule. Maybe file 1 covers May and June, while file 2 covers July and August, etc.

Can I use the tool for dispatch scheduling?

An example of dispatch scheduling is a plumbing business or perhaps an HVAC business. Here you have a variety of technicians on staff, and they visit a different client/homeowner every day. This tool can be used with minor tweaks:

- (who) – All the technicians can be entered with their appropriate (whys) such as helper, service technician, specialist, diagnostic specialist, lead plumber, quoter, etc.
- (what) – They are "working" or "servicing"
- (where) – You cannot make these the actual address of each client. There would be thousands over the course of several months. Instead, break up your days into chunks like Job1, Job2, Job3, etc. or 8am Job, 10am Job, 12pm Job, etc. or Client 1, Client 2, Client 3, etc.

- (when) – Ditto, break up the days into chunks. You might schedule a job every 2 hrs. Or dispatch specialists for longer jobs of 4 hrs each. So, you might end up with a (when) table of 8am (2hrs), 10am (2hrs), 12pm (2hrs), 2pm (2hrs), 4pm (2hrs), 8am (4hrs), 12pm (4 hrs)
- (why) – e.g., helper, service technician, specialist, diagnostic specialist, lead plumber, quoter, etc.

Then you would have to keep a separate table by date detailing the actual client address for Job 1 at 8am, Job 2 at 10am, Job 3 at 12pm, etc. The tool will schedule the right person and indicate they are working on Job 4 at 2pm for 2hrs on date xx/xx/xxxx. They would have to consult your table for the name and address of that client.

What if the version gets updated?

If I post a newer version of Scheduling-123.xlsx and you are actively using an older version, you can either wait to upgrade until you are ready to make a new schedule or download the new version now and populate it with your current data. Either way we are talking about copying data from the old file into the new file:

- All the green cells on the Options sheet need to be copied and pasted into the new file
- The Holidays table needs to be copied (since this in in the future, take this time to extend it or update it)
- The green cells on the Names sheet need to be copied over
- The green cells on the Override sheet need to be copied over but remember that is the prior schedule. You may wish to not do this and have the new version generate a new schedule.

Fellow Excel Geeks

I wrote this to learn about dynamic arrays and this tool uses them extensively. Any cell with a background fill of <mark>yellow</mark> uses a dynamic array in some way. If you want to learn how to use them study these cells.

The key assignment formula

On the Flat Assign sheet in column C you will see a formula like this. I will not try to explain all of it, but for each work slot (row) we are trying to fill we examine multiple arrays of the same length. Here is an example:

Employee ID	1	2	3	4	5	6	7	8	9	10
Bad_day=""	True	False	True	True	True	False	False	True	True	True
Bad_where=""	False	True	True	True	False	True	True	True	True	False
Assigned_in_period<max	True	True	True	True	True	True	False	False	True	True
Assigned_in_date=0	True	True	True	True	True	False	True	True	True	True
Correct_role=true	True	True	True	False	True	False	False	True	True	True

- Each column is multiplied rendering a TRUE or FALSE answer.

- We then look for the first TRUE answer going left to right and take that Employee ID as the person we assign to the work slot. In the above example, we would have chosen Employee ID #3.
- A note about the correct role being true… the work slot for this row could call for a "Staff" employee and employee ID 3 for example, could have blank in their role entry on the Names sheet meaning they are a Staff employee, or they could have "Staff" recorded. We account for either or both.
- We arrange the list of IDs in the array based on the assignment (method). This changes for each row. Here is an example of what the array might look like for the next work slot (row) based on different (method) values:

Method 1	2	3	4	5	6	7	8	9	10	1
Method 2	3	5	7	9	2	4	6	8	10	2
Method 3	5	9	3	7	1	5	9	3	7	1
Method blank	6	3	1	10	8	2	7	4	5	8

  o Changing the order ensures that if all columns calculate to TRUE and we are picking the first TRUE from left to right, we get a new employee ID from the last row.

```
=IF($A2="","",IF(E2<>"",E2,LET(factor,IF(method="",MOD(ROW(C2)*A2,whocnt),method),

n,MOD(ROW(C2)*factor,whocnt),

start_who,IF(n=0,whocnt,n),

rpos,FIND("[",B2),

thiswhy,MID(B2,rpos+1,FIND("]",B2)-rpos-1),

thismax,VLOOKUP(thiswhy,Options!$A$52:$C$61,2,0),

try,SEQUENCE(whocnt,,start_who),

next_who,IF(try>whocnt,try-whocnt,try),

date_pos,MATCH($A2,'Bad Dates'!$B$3#,0),

bad_day,INDEX('Bad Dates'!$C$3#,date_pos,next_who),

where_name,MID($B2,1,FIND(")",$B2)),

where_pos,MATCH(where_name,'Bad Where (When)'!$A$3#,0),

bad_where,INDEX('Bad Where (When)'!$B$3#,where_pos,next_who),

why_names,INDEX(name_whys,next_who,1),

past_rows,IF(ROW(C1)<(rowcnt*at_where_cnt),ROW(C1),(rowcnt*at_where_cnt)-1),

past_range_id,OFFSET(C2,-1*past_rows,0,past_rows,1),

past_range_date,OFFSET($A2,-1*past_rows,0,past_rows,1),

assigned_in_date,COUNTIFS(past_range_id,next_who,past_range_date,$A2),

assigned_in_period,COUNTIFS(past_range_id,next_who),

good_conditions,(bad_day="")*(bad_where="")*(assigned_in_period<thismax)*(assigned_in_dat
e=0)*(IF(thiswhy=default_why,(why_names="")+(ISNUMBER(SEARCH(default_why,why_names))),ISN
UMBER(SEARCH(thiswhy,why_names)))),
```

```
first_good,MATCH(1,good_conditions,0),

IF(ISNA(first_good),"C",INDEX(next_who,first_good)))))
```

```
first_good,MATCH(1,good_conditions,0),
```