



Student Employee Scheduling

Gordon Dining & Event Center

**Total Number of
Students per meal:
300 approx**

**Total Number of
Employees: 249**



Problem Idea

- Scheduling of Gordon: Dining & Event Center
- Optimizing the schedule of Dining student employees on weekly basis.
- It can be challenging to cater all the requests of student employees regarding their availability and find an optimal scheduling system in order to run things smooth.





Problem Idea

- Gordon is a dining center that is run entirely by UW Housing student employees with an average footfall of more than 300 students per meal for all 3 meals of the day.
- We chose this problem as one of us works there and feels the need to optimize the process. Currently they have a dedicated team for making daily schedules which increases the salary expenses for the UW Housing Dept.
- This problem is faced by UW Housing as it is their responsibility to provide meals for students with no compromise on quality of the food or hygiene which requires a large workforce.



Input Data

Thanks to our supervisors at Gordon's, we were able to get the actual data of Gordon Dining Center. We intend to help them optimize their scheduling system.

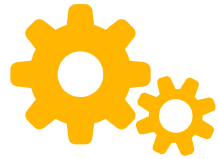
All of the data is being recorded in google forms and they have a pre-existing software which converts the input data in a excel file.

	A	B	C	D	E	F	G	H
1	Name	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
2	Yap, Evelyn	1	0	0	0	0	1	0
3	Agosto, Milo	0	0	0	0	0	0	1
4	Frantz, Hailey	0	0	0	1	0	0	0
5	Higa, Everett	1	0	1	0	1	1	1
6	Colón, Mya	1	0	1	0	1	1	1
7	McGuire, Lucas	1	0	1	0	1	1	1
8	Steensen, Caitlyn	1	0	1	1	0	0	0
9	Bly, Hannah	0	1	0	0	1	0	0
10	Chhajer, Tejasvi	0	1	0	0	0	0	0
11	Lynch, Ryan	0	0	1	0	1	1	1
12	Piechowski, Luke	1	0	1	0	0	0	0
13	Reuss, Joseph	0	0	0	1	0	0	0
14	Aziz, Akik	0	0	0	0	0	0	0
15	Braun, Olivia	1	0	0	0	0	1	0
16	Yang, Savanna	0	0	0	0	0	0	1
17	Cao, Xiwei	0	0	0	1	0	0	0
18	Zhao, Ziyi	1	1	1	1	1	0	0
19	Peng, Yuliang	1	1	1	1	1	0	0
20	Mohanty, Ankit	1	1	1	1	1	0	0
21	Thunga, Divyanee	1	0	1	1	0	0	0
22	Abramson, Matilda	0	1	0	0	1	0	0
23	Jonnavithula, Girish	0	1	0	0	0	0	0
24	Ayer, Samantha	0	0	1	0	1	1	1
25	Zhang, Yipeng (Michael)	1	0	1	0	0	0	0
26	Berg, Jens Philip	0	0	0	1	0	0	0
27	Blazer, Marissa Leeann	0	0	0	0	0	1	1
28	Bergeman, Gracie Wei	1	0	0	0	0	1	0
29	Yang, Yiheng (Kevin)	0	0	0	0	0	0	1



Ideas for Analysis

- Currently this process of scheduling is done on excel with manually reading details from a google form and added to a template.
- After this optimization we would only need to enter names of the employees, their availability and solver would give an optimized time table saving ample of time for other work.
- Would increase capability to feed more students efficiently with required number of student employees(not too much, not too less)
- Along with saving time this would eliminate most of human error.



Optimization Model

Objective

The Objective is to formulate an optimized schedule for student employees as per their availability and serve great dining experience to all students.

DVs

No. of Student Employees req. per shift
No. of Shifts in a day (i.e., 3)
No. of days (i.e., 7 days)

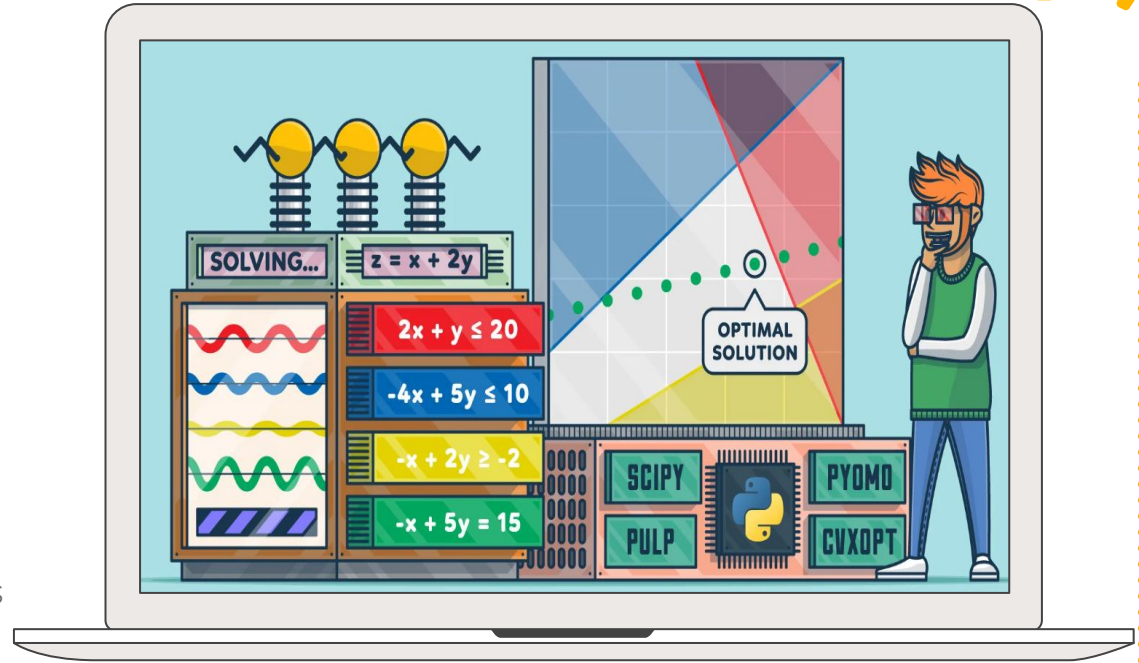
Constraint

Min employees per shift,
Max closing shift
Max shifts per day,
Min shifts per employees

Tools Used!

- PYTHON
 - PANDAS
 - PYOMO

We are using Python in attempt to optimize the process. We choose Python over Excel as this is a scalable project and Excel has limited number of data variables. Also, when an employee quits the job or a new one joins it becomes very easy in Python to make those changes.



Roadmap



Import Necessary
Libraries



Declare Objective,
DV's, and Constraints



Choose Solver



Import Data



Create Model for
Optimization



Optimize! Optimize!
and Optimize!

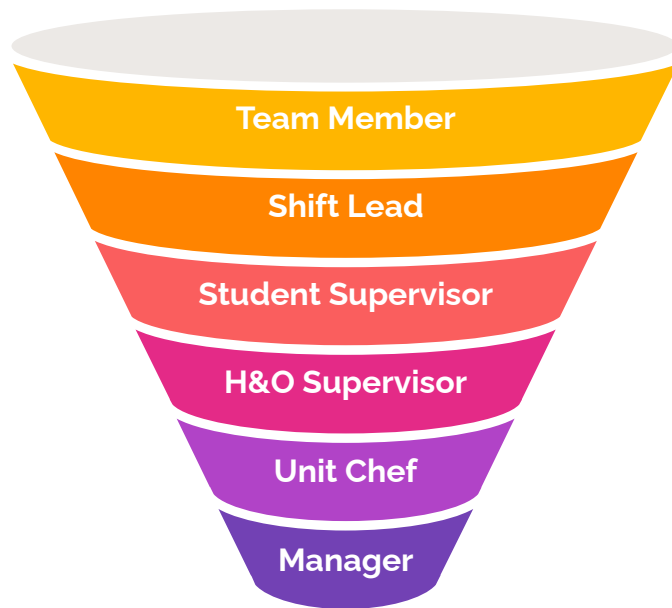




Key Assumption

The designation of student employees wouldn't matter until and unless we have enough workforce on the floor.

For instance, if we have enough employees on the floor then their title/designation (Team Member, Shift Lead, Student Supervisor) wouldn't matter as everyday work flow is defined by Housing Board and Unit Chef.





Challenges

- The model would allocate shift to employees contradicting their availability.
- Creating a csv file that is readable to everyone so that there is no confusion throughout the day.

When you delete a block of code
that you thought was useless



Client Interface



NAME	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
Yap, Evelyn	[1, 0, 0]	[0, 0, 0]	[0, 0, 0]	[1, 0, 0]	[1, 0, 0]	[0, 0, 0]	[0, 0, 0]
Agosto, Milo	[0, 0, 1]	[0, 0, 0]	[0, 0, 1]	[0, 0, 0]	[1, 0, 0]	[0, 0, 0]	[0, 0, 0]
Frantz, Hailey	[1, 0, 0]	[1, 0, 0]	[1, 0, 0]	[0, 0, 0]	[0, 0, 0]	[0, 0, 0]	[0, 0, 0]
Higa, Everett	[1, 0, 0]	[1, 0, 0]	[1, 0, 0]	[0, 0, 0]	[0, 0, 0]	[0, 0, 0]	[0, 0, 0]
Choong, Jing Wen	[1, 0, 0]	[1, 0, 0]	[0, 0, 0]	[0, 0, 0]	[0, 0, 0]	[0, 0, 0]	[0, 0, 1]
Munson, Lance	[1, 0, 0]	[1, 0, 0]	[0, 0, 0]	[0, 0, 0]	[0, 0, 0]	[0, 0, 0]	[0, 0, 1]

Benefits

- UW Housing wouldn't have to spend \$18/hour per student for a group of 4-8 members to generate schedule.
- This model eliminates human error.
- Much more optimized allocation and without dedicating resources.





Limitations

Flexibility of choosing shifts i.e., which meal of the day employee wants to work.

Special days cannot be added. For example Gordon hosts a special menu and expects larger crowd to walk-in. Then this model cannot implement special conditions for a particular day.

Know your limits





Scope

- If there was more time we would have added the feature to allocate employees in more specific format with shifts assignment i.e., breakfast, lunch or dinner.
- Looking ahead in the future we could commercialize this model by creating an application where the whole data is fed and user only have to input number of employees required and in which part of the day and this would give them full lists of student allocation.





What we offer our clients

- UW Madison Housing - Dining and Culinary Services
- The benefit from this project is to improve management of workforce with equal distribution of work.
- Better employee satisfaction without straining any piled up work on a few.
- Provide quality services to students of the University.
- This project is not only applicable for Gordon but can be used by all types of organization for optimized allocation of workforce.



650,880\$

That's a lot of money saved!

101,700 meals

And a lot of meals served per semester!

100%

Quality Service!



Thanks!

Any questions?

You can find us at spatil25@wisc.edu & npatel72@wisc.edu



Team Presentation



Shantanu Patil
OPTIMIZATION SPECIALIST



Nishit Patel
BUSINESS ANALYST

We both contributed to this project equally in all aspects.