Staffing Primal Eats Café

Primal Eats Café is a mid-sized restaurant located in Cardiff-by-the-Sea and it has been serving the area for nearly 25 years. The café is famous for its large portions, reasonable prices and friendly atmosphere.
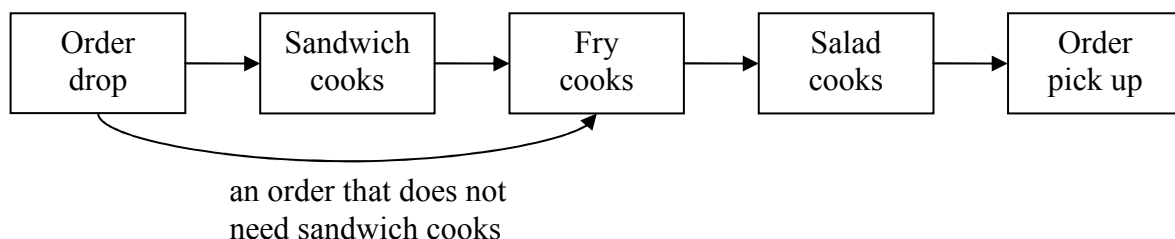
Problem Definition

The ownership of Primal Eats Café has recently changed. The new owner, Pat Weber, has been observing the employees since he took over the café and noticed that they spent a large portion of their time idle. He thinks that the staffing levels can be reduced without degrading the quality of the service. However, he does not want to go through the process of downsizing without a careful study. Furthermore, Primal Eats Café will soon face the busy tourist season and Pat does not want to be left under-staffed.

You have been asked to carry out a simulation study of Primal Eats Café with the purpose of determining the staffing levels that will provide prompt service to the patrons. The current staff consists of one host, four sandwich cooks, two fry cooks, three salad cooks, four servers and two bussers. You have talked to Pat and the staff, and found out that the eating experience of a party consists of the following steps:

1. The party is welcomed by the host. There are two types of tables in the restaurant: small and large. If the party consists of fewer than 2 people, then the party is seated at a small table. Otherwise, the party is seated at a large table.

2. An available server takes the order and drops the order in the kitchen. The kitchen prepares the order.

3. When the order is ready, an available server picks up the order from the kitchen and brings the order to the table.

4. The party eats. Some parties may need assistance from a server while they are eating.

5. When finished eating, the party gets an available server and asks for the check.

6. An available server (not necessarily the one in Step 5) goes to the cash register, gets the check and gives it to the party.

7. The party pays and leaves.

8. An available busser picks up the check and cleans the table.

There are three important points about the process above:

*   The servers are not assigned to specific tables or parties. Any server can serve any party at any time.

*   The drink orders are brought together with the food orders.

*   The cook stations in the kitchen are organized in a linear fashion. The first station is the sandwich cook station. If an order has items that need to be prepared by the sandwich cooks, then these items are prepared first. After preparing these times, the sandwich cooks turn the order to the fry cooks. The fry cooks prepare the items on the order and turn the order to the salad cooks. Finally, the salad cooks prepare the items on the order. Clearly, an order may skip a cook station, if there are no items on the order that need that particular cook station. The following figure shows the food preparation process in the kitchen:

an order that does not
need sandwich cooks

Performance Measures and Objective

Pat wants to provide a pleasurable dining experience to the patrons. In particular, he wants to minimize the following unpleasant delays:

- Long seating times – The seating time is the time interval between when a party arrives at a restaurant and when it is seated at a table.

- Long waiting times – The waiting time is the time interval between when a party orders its food and when it actually receives the food.

- Long hang times – The hang time is the total time during which a party waits for a server to help them. This time includes the seating and waiting times along with the time spent by the party to have their order taken, the time spent by the party to get the check and other delays caused by the lack of servers.

Pat has asked you to assess how many hosts, sandwich cooks, fry cooks, salad cooks, servers and bussers to have so that the delays above are going to be reasonably low. Currently, Pat estimates that the seating times are about 3 to 5 minutes. He thinks that seating times above 8 minutes are not reasonable. He has not paid attention to the waiting and hang times before. Consequently, he wants you to assess how different staffing levels affect the waiting and hang times so that he can make an informed decision. Of course, you are welcome to examine other performance measures that you see appropriate.

Data

You spent the last two weeks collecting data in the restaurant. The three worksheets in the accompanying spreadsheet contain the following data:

- Worksheet 1 – This worksheet contains data related to customer arrivals. The data included on this worksheet are as follows:

    A. Party no – This field is a simple counter. 1041 parties arrived over two weeks.

    B. Day – This field is the day on which the arrival occurred.

    C. Time of day – This field is the time of day at which the arrival occurred. The café starts serving at 11:00 am and stops accepting patrons at 10:00 pm. (Time 22.00 corresponds to 10:00 pm.)

    D. Party size – This field is the number of people in the party. If there are 2 or fewer people in the party, then they are seated at the small tables. Otherwise, they are seated at the large tables.

    E. Dining duration – This field is the time interval between when a party receives its food order and when it finishes eating its food.

- Worksheet 2 – This worksheet contains data related to the food preparation time. You have observed the food preparation process for a very limited time and collected data on how much time it takes for a cook to prepare an item. The data included on this worksheet are as follows:

    A. Sandwich cook – This field is the amount of time that a sandwich cook spends on preparing an item.

    B. Fry cook – This field is the amount of time that a fry cook spends on preparing an item.

    C. Salad cook – This field is the amount of time that a salad cook spends on preparing an item.

- Worksheet 3 – This worksheet contains data on what types of orders people place. Each row corresponds to an order from a particular person. The data included on this worksheet are as follows:

    A. Sandwich – This field indicates if the person ordered an item that needs to be prepared by a sandwich cook.

B. Fry – This field indicates if the person ordered an item that needs to be prepared by a fry cook.

C. Salad – This field indicates if the person ordered an item that needs to be prepared by a salad cook.

For example, the first entry states that this person ordered two items, one of which needs to be prepared by the sandwich cook and the other one needs to be prepared by a salad cook. There may be several people in a party and the food order for the party is the "sum" of the food orders of the individuals.

You were not able to collect data on several activities. From the discussions with Pat and staff, it appears that it takes about 3 minutes for a server to take the order and 2 minutes for a server to give the check to the party and 2 minutes for a busser to clean the table. About 60% of the parties need the server again halfway into their meal. If a party needs a server halfway into its meal, then it occupies the server for about 3 minutes. Having gotten the check, a party spends about 4 minutes at the table before leaving.

You can assume that the servers and bussers walk with a speed of 150 feet/minute. When the host is seating a party, she walks with a speed of 60 feet/minute. She walks with a speed of 150 feet/minute at other times. A plan of the café is provided at the end.

Deliverables

Your project report should be made up of a main report for Pat and technical appendices to allow other simulation specialists to repeat your analysis. Remember, the main part of the report is for non-specialists. They are intelligent and know the business, but are not familiar with all of the jargon that goes along with simulation modeling.

The ideal length for your project report is 15-18 pages (excluding appendices). Below is a suggested outline. You do not have to follow the exact outline (apart from the executive summary), but you should be sure to include at least this much information.

- Executive summary – This is the only part of your report that many high-level managers will read. Give a synopsis of what you were asked to do, what you did and what you discovered. Do not just outline what is in the report. Think what you would want to know if you were a high-level manager, and this was all that you read. This section should be at most 1 page.

- Modeling approach and assumptions – Describe the simulation model in general terms. Say what you modeled and what you did not. Describe how the model works and what data are needed to drive it. Describe the assumptions used in putting the model together and justify them. Just saying that you made a certain assumption may make the reader wonder about the validity of that assumption. What are the strengths and weaknesses of the model? Why did you not model certain things, or decide to model others? This section is for intelligent non-specialists. They want to ensure that your model is reasonable and captures all of the important aspects.

- Model verification and results – Explain in broad strokes how you checked that your model was correct as implemented. (Decision makers want to be convinced that your model is correctly implemented, but do not want to know every gruesome detail.) Give the results for the relevant simulation runs that you performed. Explain any trends and potentially surprising results. Did Pat mention any information that you can use to validate/verify your model?

- Discussion of results – Analyze your simulation results, and discuss the results. Zoom in on the essentials. Give the results for any final plan(s) that you recommend. Think about *sensitivity analysis*. Only answer the ones that the model is "qualified" to answer. Use charts, tables and figures to make your point. Remember that Pat would be happy to see the answers to some of the questions that he forgot to ask. Remember that one of Pat's worries is not to be understaffed for the upcoming tourist season.

- Conclusions – State the conclusions that you derive from your simulation study.
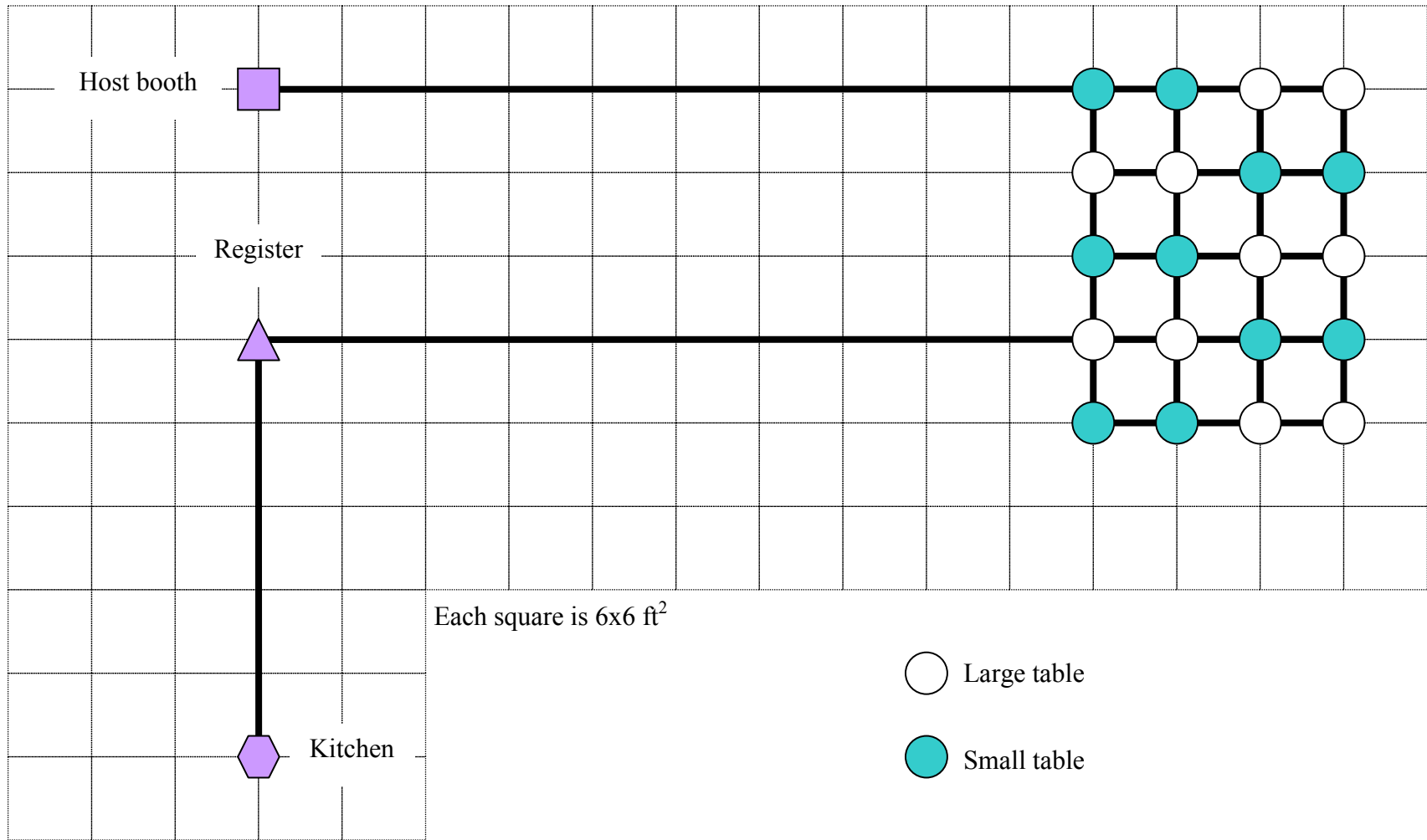
- Appendix – Think separately about the *model* and the *implementation of the model* in ProModel. (The model exists separately from ProModel and could have been implemented in another package.) Give the details of your model. Include all parameters of the distributions, to the point that another simulation specialist could reconstruct your model. (Though, it is not necessary to explain what a nonstationary Poisson process is.) Describe any tricky aspects of implementing your model in ProModel. It is not necessary to give *every* detail on how the implementation works. Include your model file so that someone could replicate your results.

Your report is due by December 2, 5:00 pm, in the drop-box located on the second floor of Rhodes Hall. Late reports will be penalized by 15% per day. (This policy also applies to the project-related assignments). Be sure to give the name of all team members on the title page or equivalent. You will also post your ProModel model on the course website. Be aware that software **_ALWAYS_** goes down the day before a project is due. This will not be accepted as a reason for turning in the report late. Remember that this is the last week of classes, so you will be busy with other work.

Random Suggestions

- Make sure that you understand everything in "Advanced Commands in ProModel" chapter in your course packet.

- You are advised to avoid using "WAIT UNTIL" command as much as possible. Try to find an alternative way.

- A common mistake that the students make is to assume that the project is only an exercise in model building. The project is an exercise in model building, model analyzing and report writing. Make sure that you spend at least 30% of your time on each one of these activities. Do not turn in your report without proofreading at least three times.

- Start early.

- Think about the topics we covered on output analysis and comparison of alternative systems, and use them.

- The quality of the report counts – probably much more than you think.

- In the description of the eating process on the first page, assume that the party leaves immediately after Step 7. In reality, you should also model the time that the party spends to get their change. However, if you try to model this part of the eating process as well, it will get too repetitive.

- Think about sensitivity analysis, and use charts, tables and figures in your report.

- It is possible that not every detail has been described. You are free to make reasonable assumptions, but state and *justify* them.

- Make sure that your report has personality and logical flow. Do not give mechanical and/or unstructured answers to the questions posed in the previous section.

Host booth

Register

Each square is 6x6 ft²

Kitchen

◯ Large table

🔵 Small table

Project Team Evaluation

Each team member should put his/her evaluation in a separate envelope. Turn in the envelopes with your project report. Your project will not be graded unless we receive an evaluation form from every team member.

Rate all of your team members on a scale from 0 to 10. A score of 10 means that the person contributed reasonably to the team effort. A score of 0 means that the person contributed nothing. Please also rate yourself. If you do not give a score of 10 to every member of your team, then shortly justify your assessment. When making your evaluation, consider the contribution of each team member to the project-related assignments you turned in earlier. You can be absolutely sure that your evaluations will remain confidential.

Name	Score
(Yourself)	

Justification

(You can use the back if you need to.)