

Overview

At LeanTaaS, we pride ourselves on considering bright, driven candidates from a wide variety of backgrounds. To make sure that you can showcase your full range, we'd like you to complete this take home exercise. We know your time is valuable, but we've given you this exercise for the following reasons:

It gives you the opportunity to learn about us. Did we choose a thoughtful and challenging exercise? Are these types of problem solving and analytics for you? If so, you'll be more excited about working for us.

It gives us the opportunity to learn about you. Were you able to clearly communicate your ideas and assumptions? Can you strike a good balance between completeness and time to ship? Are you comfortable navigating with imperfect data or making conclusions in imperfect contexts? This is your time to shine, so show us what we can't see in the limited time available in a phone screen or interview.

Our expectations: We don't expect you to spend all weekend on this (an afternoon, maximum). We know you have limited information; it's okay to make some assumptions and base your work off those. (But if you have questions, don't hesitate to ask!) We look forward to getting a glimpse into your thinking process and creativity.

Complete the exercise below using whichever tools you prefer. For some loose requirements, imagine yourself as a member of our team where:

- Your results will be used by our customers, so we must be confident in the findings.
- Others on the team will want to understand and reuse your methodology, so be sure to use clear variable or field names and annotate your work as required.
- We don't use paid statistical software like SAS, SPSS or Stata at this time. Please use something free (like Python, R or SQL) or Microsoft Excel or Tableau, or a combination of them, for which we do have licenses.
- The results of the assignment should be summarized in a short report or slide deck that is clear and professional enough to show to a customer. Please also send the workbooks or scripts you used to do the analysis.

Context

The iQueue for Operating Rooms is a software product to free up capacity in operating rooms and create a much more transparent and surgeon-centric process for measuring Operating Room (OR) utilization.

A typical hospital will have multiple ORs, e.g. 10 rooms and they are staffed to carry out surgical procedures Monday to Friday. OR management has utilized a system called Block Scheduling to arrange and coordinate their surgeons to schedule their surgeries smoothly. The idea is that a room is typically reserved for a certain surgeon, or a group of them on a certain day-of-week. E.g. Dr. Johnson gets Room 1 on every Monday, the Thoracic group gets Room 2 on every Wednesday etc. It sometimes can be a bit more nuanced, e.g. the frequency could be bi-weekly or others, and sometimes people may give half day blocks instead of full day blocks depending on the typical case length and volume. Also, many hospitals may assign some open time in some rooms on some days, e.g. every Monday and Wednesday Room 5 is open and it follows FCFS. The benefit of the Block Scheduling system is that it provides some certainty for surgeons and other people involved to carry out a surgical case successfully. The problem with it is that sometimes surgeons cannot fill their blocks well with the cases, e.g. they go on vacations or attend conferences or simply have a slower season etc.

One of the modules within the iQueue for OR is called Exchange, which is a marketplace for OR time. Basically if Dr. Johnson is going to a conference in 5 weeks and knows that he will not need to utilize that Monday block then he can release the time and other people can have the visibility of that released time and may request it in order to utilize the OR resource. In the hospital setting, surgeons, or their schedulers will initiate such requests or releases, and then the OR schedulers will review such activities and make sure they are legit and respond and/or update their internal system.

Assignment

You work at iQueue for Operating Rooms as a Data Analyst. Recently a new customer just went live with our software. They have adopted the Exchange module and their executive sponsors for our product wants to know how the implementation has been.

The customer success team has a few questions:

- How many minutes of requests, transfers and releases have been completed? The marketplace is successful if there's a good amount of activities from both sides.
- What is the denial rate and response time? The marketplace is easy to use if transactions are both quick and easy.

In order to get a more complete picture, the customer success team has tasked you to help answer **how effective the marketplace is** by answering these questions along with any additional findings you can provide. So given the attached data for the Exchange transaction history, your job here is to create a narrative for the customer success team and the executive sponsors. You need to think through how you want to define effectiveness, e.g. maybe it's only effective if the time released are requested etc.. Also think through the secondary metrics, e.g.

what can the team track and encourage in order to increase the effectiveness etc.? The exercise may include the following:

- Prepare a short executive summary for your findings and potential actions for the executive sponsors at hospitals.
- Prepare a dashboard that tracks certain metrics that can tell your narrative on how effective the marketplace is.
- Prepare a short note suggesting to the internal team on what additional data needs to be pulled and investigated, if any.

Data

The data for this exercise is available in the form of a SQLite database file named LeanTaaSTest.db. The database contains one table called exchange_transactions which contains the transactions logged by the Exchange application discussed above. A data dictionary can be found below which describes the contents of the database. As mentioned, you are free to use any of the tools above to extract and analyze the data. If you are not familiar with SQL take a look at the following tutorials and feel free to ask any questions:

<https://www.w3schools.com/sql/default.asp>

<https://dbeaver.io>

Data Dictionary

Field Name	Description
transaction_id	A uniquely generated serial number for each individual transaction on the Exchange platform.
parent_transaction_id	The transaction id of the parent transaction or responses (approve, deny, mark updated).

action	<p>The type of transaction:</p> <ol style="list-style-type: none"> 1. RELEASE - A release of existing block time 2. MARK_UPDATED - The parent transaction has been successfully updated in the hospital's EHR 3. REQUEST - A request for open time 4. APPROVE_REQUEST - The parent request has been approved 5. DENY_REQUEST - The parent request has been denied 6. TRANSFER - A transfer of time from one person to another 7. APPROVE_TRANSFER - The parent transfer has been approved 8. DENY_TRANSFER - The parent transfer has been denied
scheduler	The person creating the transaction.
surgeon	The surgeon for whom the transaction is made.
created_datetime	Date and time when the transaction was created.
snapshot_date	The date of the block associated with the transaction.
start_time	The start time of the block associated with the transaction.
end_time	The end time of the block associated with the transaction.
room_name	The hospital room of the transaction.
location	The hospital location of the transaction.