Streamlining HPLC Pump Performance Analysis

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Previous issues with pumps

1. Hard to track who is using each pump and how it was used
2. No optimized inventory system of purchased repair parts
3. Hard to determine common causes of pump failure

The goals of this project

1. Create a working SQL database to track the usage of pumps, the inventory of parts needed, and to allow users to reserve certain pumps for experiments.
2. Decrease the labor time and costs of repairing a pump
3. By increasing the reliability of pumps, the cost to run and repair will drop leading to fewer pumps breaking during experiments, which would cost beam time and labor.

Designing the GUI using PyQT

In order to create the GUIs, I used a program called PyQTDesigner, which allows users to create GUIs and convert them into python files. Once converted into python files, the user can create their own logic python file in order to control how to the GUI interacts with the SQL database.
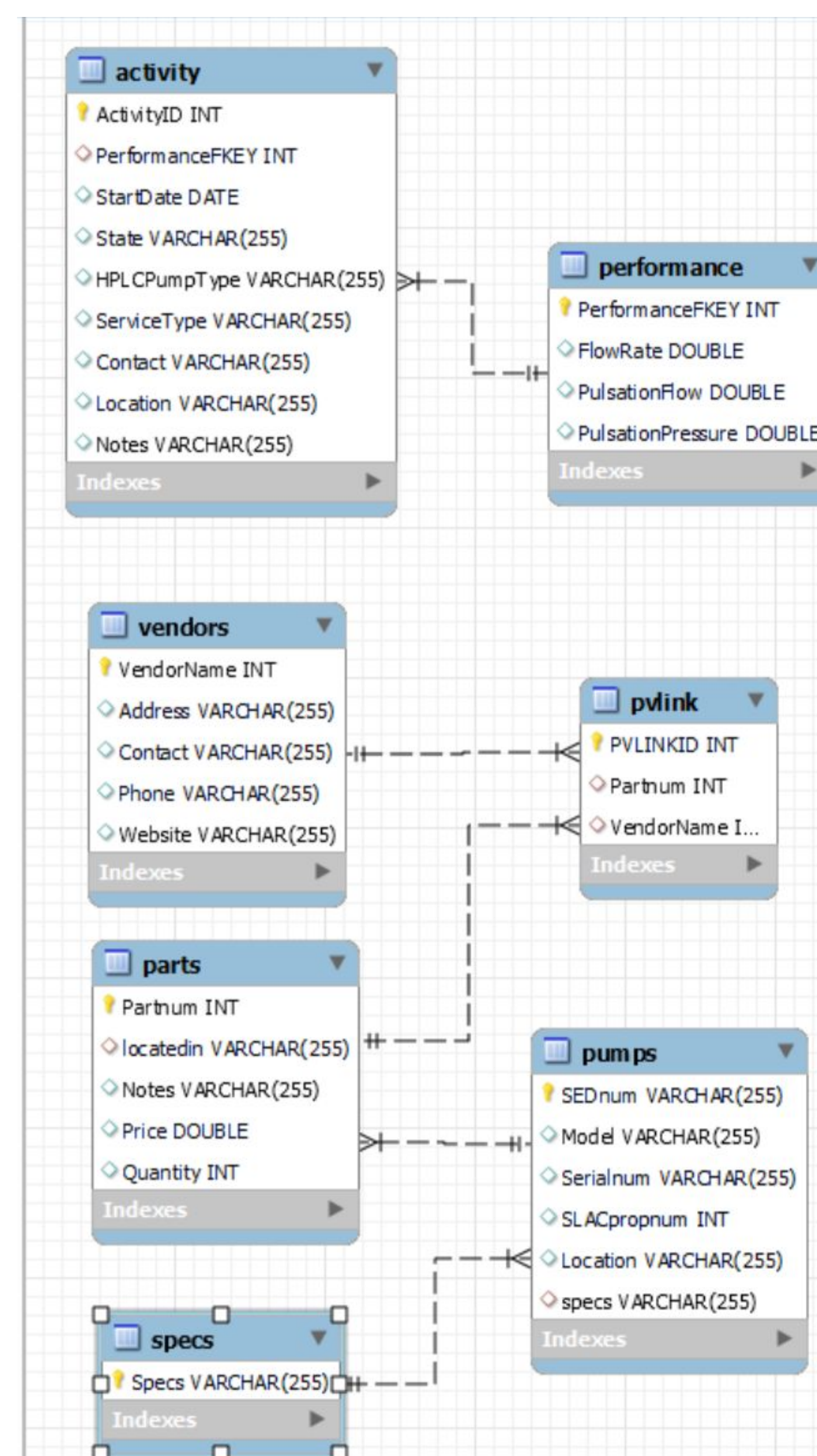
Creating a database

For this project, I used mySQL which allowed to me to use SQL, structured query language in order to design a relational database. A relational database is quite important for this project as it allows for data consistency in between tables in order to prevent repeating data values. Additionally, a relational database is flexible and scalable, meaning users can add tables as they see fit. A graphical representation of what a relational database is shown on the bottom left.

The future of this project

In conclusion, while this database was only created to track HPLC pumps, the underlying concept of a database holds significant potential to be used in broader applications across labs at SLAC with minor adjustments. As for the the future of this specific database, it can continue to be used and improved as long as it is continually updated with new data. Additionally, new additions to the database and additional GUIs can continue to be added as needed in order to continue to improve efficiency in pump usage and reliability.

Acknowledgments