Enterprise Scale Inventory Optimization: Building a Modern Web Application to Improve Inventory and Supply Chain Optimization by Incorporating Advanced Analysis and Business Intelligence into Existing Techniques with a Cohesive, User-friendly Solution.

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Many corporations lack the software and knowledge for advanced inventory optimization and management, so suffer stockouts, bloated inventory, and inefficient ordering policy. Material Requirements Planning (MRP) is an algorithmic approach to inventory planning and optimization. MRP requires significant computation to be implemented. At the largest organizations, these calculations are often performed by SAP, an ERP system, and at smaller companies, it's done in Excel and input into another automatic replenishment system, or not at all. In either case, access to MRP is limited by cost, required knowledge, or excessive time requirements. The purpose of this study was to design and build a program to automate the calculations needed for MRP, independent of any specific system, with the goal of universal compatibility. The program is comprised of three core components, a ReactJS frontend, an Express/node.js backend, and a Flask REST API. Incorporated into the application are full user authentication and authorization, database interfacing with MongoDB, file storage with Azure, client-side visualizations generated with Nivo, forecasted ordering/inventory simulations, and MRP calculations. The researcher was the sole project contributor. The program performs classification, policy assignment, and safety stock/reorder point calculations with a high degree of customizability and automation, and uses universally accepted .csv and .xlsx outputs for easy integration with any automated replenishment system. Through automation, the program reduced the time taken to perform calculations from three hours in Excel to less than five minutes. This program eliminates the drawbacks of such analysis for both large and small companies.

Awards Won:

Fourth Award of $500