Export/Import Operations and Administration System

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Introduction
We developed a new database application for SriKrishna Logistics®, a company based in Mumbai, India, engaged in the customs clearing and forwarding activities of import and export firms. Such firms deal with various activities ranging from logistics management, inland transportation, Customs duty clearance, etc. Their original system relied on a set of Microsoft Excel spreadsheets, some paper forms, and several other procedures which were either semi-automated or manually done. Our software has been developed to resolve all these problems and also provide new views of data that will help the company to better manage its operations. The GUI is designed to be intuitive and user-friendly. Our application aims to be a one-stop shop for all operations related to import clearance activities in our sponsor’s firm. We hope that it will provide a cost-effective substitute to the present system used by our sponsor.

Objectives
- Capture all of the company’s existing system’s requirements
- Reduce redundancy of data input as far as possible
- Channelize these in the form of raw data and relevant relationships which encompass all of the sponsor’s needs
- Integrate different functions through automation
- Make an outline of the functional requirements based on interactions with the sponsor and the database visualized
- Improvise and accommodate features based on periodic feedback received from the sponsor.
- Build an efficient and well-structured relational database
- Conduct database stress testing to simulate conditions of work environment
- Develop a user-friendly GUI for all the functions involved
- Input live data and run the new system in parallel with the existing system to compare the results.

System Design Overview
Our software will be used by more than 50 employees at our sponsor’s firm. Each of them accesses a centralized PostgreSQL® database hosted on a Red Hat Enterprise Linux® Server through their remote workstations, as is evident in the figure below:
UI Implementation

It was a very daunting task to export data to Microsoft Excel spreadsheets in a pre-organized format. To do so, Qt provides the ActiveQt framework to seamlessly combine ActiveX and Qt in the form of QAxObject. Additionally, to display certain dynamic reports to keep track of processes/flows from commencement of job to completion, we designed SQL statements at runtime. These were coupled with the Model/View UI architecture provided within Qt in the form of dynamically programmable and customizable widgets.

Testing and Evaluation

- **AppPerfect**
  - Software used for Database Stress Testing

- **Simulate Actual Deployment Scenario**
  - Concurrent access by 45 users over a period of 3 minutes, each performing real-time operations.

- **Evaluating Test Results**
  - All hits successfully returned
  - Response time commendable
  - Indicative of scope to increase users

Database Implementation

- **PostgreSQL**
  - Relational Database Management System (RDBMS)
  - PostgreSQL License - public domain

- **Red Hat Enterprise Linux Server**
  - Running on Amazon Web Services

- **pgAdmin**
  - Development platform for PostgreSQL

- **Qt Creator**
  - Cross-platform, C++ integrated development environment
  - Easily integrates with PostgreSQL

- **Qt Designer**
  - Easily port rough sketches
  - Customizable widgets and dialogs

Figure 2 - Qt Designer in action

Figure 3 - DB Stress Test Results
Conclusion

We aspired to develop a database application to support the business needs (operational and administrative) of our sponsor and we have largely met our initial objectives. Our software resolves problems of data redundancies found in semi-automated or manually conducted practices of using MS Excel spreadsheets and paper forms. It also provides new views of data that help the company to better manage its operations. Our sponsor’s feedback is encouraging and they aim to shift to our system within 2-3 months.