UNIVERSITY OF BUCHAREST
FACULTY OF MATHEMATICS AND INFORMATICS

Bachelor's degree

SQL QUERIES OPTIMIZATION FOR RELATIONAL DATABASES

Summary

The study of the bachelor's thesis emphasizes the role of databases in the delivering parcels activity, by implementing an application that uses a relational database for processing the information. The interest to monitor a database is suggested by the impact behind application informations which represent the proof of service provision, providing a concrete analysis of its activity. The stored data is meant to be the raw material in determining forecasts and future solutions.

The implemented solution is a web application called UrbanFast Courier Services, developed for Bucharest. The basic activity involves the provision of the standard postal service with declared value, through which it performs a transport in a certain time, communicated when picking up the package, between the sender and the receiver, for an amount which may not exceed the declared amount by the sender.

The functionality of the application, incorporated in a Laravel MVC framework, presents two usage flows: user client and administrator. The client mode includes the possibility to create an account, log in and introduce personal information as phone number, email and address. Using the information given, an order is launched to the courier in order to deliver a package to a recipient, giving the user the opportunity of order customization by choosing the delivery route, implemented with the help Google Maps JavaScript API. From the administrator mode, the processed orders are followed and the status of the orders is updated so that the customer follows the evolution of the placed order.

The technologies used for database design: Oracle Enterprise Manager 11g Release 2, Oracle Instant Client 11.2, phpMyAdmin, Laravel, diagrams.net.

The general definition of the optimization concept was outlined, extending the SQL Tuning purpose, as finding the best way to execute requests in terms of response time. The underlying processes of SQL execution cycle have been studied from the point of view of the user process (which generates the SQL command) and of the server process (which executes the SQL command). The application execution process has been deepened, introducing two ways to optimize SQL command level - optimization based on rules (Rule-Based Optimizer) and based on cost (Cost-Based Optimizer). The thesis study analysed the optimizer decisions on how and what optimization method to use, on how CBO collects its statistics for drawing up the execution plan and the advantages and disadvantages of the two methods.

Database optimization was successfully accomplished by creating the delivery application, obtaining a detailed analysis of the organizational flow for processing application data. Database optimization is an important step in its life cycle process. The elaboration of the bachelor's thesis required the documentation on steps to optimize a database. The thesis deepened what it means to go through these stages and the theoretical and practical demonstration of how the optimization is performed on relational databases SQL queries.