ISTuneUP

AUTOMATIC PERFORMANCE OPTIMIZATION FRAMEWORK FOR IDENTITY AND ACCESS MANAGEMENT SYSTEMS WITH BACKEND DATABASES

Sachini Sankhala Samson

Department of Computing

Informatics Institute of Technology, Sri Lanka
In collaboration with
University of Westminster, UK

2020

Abstract

Maintaining the applications under optimum performance conditions are crucial. Out of many components which affect the performance of a system, the backend databases which involved in data persistence have been known to be affecting the performance by a high marginal. Identity and Access Management Systems (IAM) maintain large amounts of heterogeneous sensitive data in backend databases and it was identified there is an impact of the database performance for the overall identity system performance. Therefore the research would be based on performance optimization on the backend database of IAM systems.

There are mainly two approaches to database optimization as physical design optimization and configuration based optimization. While both the approaches have been analyzed, the project is developed around configuration parameter optimization. The author has researched problems faced by database administrators while trying to optimize databases using configuration parameters. To overcome the problems identified, an automatic performance optimization framework was proposed. The solution targets supporting the database administrators with time and resource-consuming process of optimization. ISTuneUP provides the flexibility to choose the performance metrics which is needed to be optimized while the process could be carried out as single-objective optimization or multi-objective optimization. Ability to set up the configuration boundaries based on the resources allocated on the system is an added advantage for the administrator. ISTuneUP incorporated a dashboard to provide an intuitive visualization of the details of the performance testing. Optimization process is carried out as an Offline tuning on the back-up database as the setup needs constant server restarts which cannot be carried out in a deployed system. But the database administrator has given the ability to set the identified optimums to the deployed system once the process has been completed.

ISTuneUP was able to provide optimum configurations within a considerable amount of time with a low computational cost. With excellent potential on the project, future improvements were identified which can lead the research to a more generic optimization framework. The current architectural design provides the flexibility to incorporate the identified future enhancements without harming any existing internals components.

Keywords: database optimization, configuration optimization, Identity server, performance improvements, experimental approach.