Comparison of RBAC in Open-Source Databases

Introduction

- Access control is one of the most important security features in a database management system.
- One of the most popular forms of access control is Role-Based Access Control (RBAC) which assigns roles to the users in a DBMS and assigns privileges to those roles.
- A 'transaction' occurs when a user assigned a certain role is authorized to access that resource in a database.
- The open-source databases for which RBAC has been implemented are MySQL, PostgreSQL, and MongoDB which are some of the most popular databases used today.
- The application being implemented to study RBAC for its management is that of a healthcare management system.

Objectives

- One of the primary objectives of this study is to implement RBAC for each of the databases.
- Analyze the ease and efficiency of its implementation of RBAC in each database as a built-in feature or a manually added feature.
- Compare the implementation of RBAC with respect to the application for each database as well as against each other.
- Comparison of the performance of the database using built-in RBAC versus manually added RBAC as a key feature.

Role Assignment

A user must be assigned a role to gain access to a resource.

Role Authorization

A user assigned a certain role must be authorized for that role.

Transaction Authorization

A transaction can only take place if it is authorized for the active role of that individual.

Database Application Model

- The database application is designed to manage patient records of a hospital information system.
- The different roles are doctor, nurse, and pharmacist.
- Privileges:
  - Doctor: can edit all patient information.
  - Nurse: can see patient’s information but not edit it.
  - Pharmacist: can see only medications of patients.

Future Work

- The implementation of RBAC in graph databases such as Neo4J is to be analyzed.
- Given the efficiency of RBAC, we can also explore if RBAC can be implemented along with Attribute-Based Access Control (ABAC) to utilize the best of both forms of access control.

References