Superusers

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WHAT'S COVERED

This lesson explains why superuser accounts are useful but also a potential security risk, and provides best practices for minimizing the security risks they pose, in three parts. Specifically, this lesson will cover:

1. Understanding the Superuser Role

As you learned in previous lessons, you can create a login user role for each user who needs to access your database system. That user role can be granted certain privileges and can be included in a group from which it can inherit privileges.

Whether it is an operating system or a database, every system needs at least one user account that has full privileges to do everything with every command, function, and resource. That need is met by a special role called **superuser**. A superuser can bypass all permission checks and access all types of powerful operations. It has unrestricted access to everything in the database.

KEY CONCEPT

A database superuser does not automatically have unlimited access to the operating system of the server on which the database system runs. Superuser status applies only to activities within the database system.

TERM TO KNOW

Superuser

An account role that has unlimited access and privilege to every object and activity in the database system.

2. Security Risks Posed by Superusers

Because of the power of the superuser role, database administrators must take great care to make sure the role is not misused, either intentionally or by accident. An attacker with access to a superuser account could do unlimited damage, up to and including permanently deleting the entire database.

EXAMPLE Rather than deleting the database, which would be immediately noticed, an attacker might act more stealthily.

For example, if an attacker had temporary access to the superuser role in a database, they could create additional login roles that would enable them to sign in later and cause further damage or steal more information. Even if the superuser role they were using to breach the system were removed, they could still have a way into the system via those other roles they created.

They could even remove evidence of their activity within the system. For example, an intruder with a superuser role could create orders within a system and have items that they did not purchase sent to them. Once the order has been sent out, they could delete it and any related data so that the system has no information about that order.

3. Protecting Against Superuser Misuse

Minimizing the security risks associated with a superuser account is essential to maintain the database's confidentiality, integrity, and availability. Here are some practices to help mitigate these risks.

3a. Limit Who Has Superuser Access

Grant superuser privileges only when absolutely necessary, applying the **principle of least privilege**. In a large organization, some IT and database professionals may never—or seldom—need superuser access.

TERM TO KNOW

Principle of Least Privilege

A security best practice that dictates that each account should have only the privileges it needs for the user to accomplish their assigned work.

3b. Separate Duties

Avoid using the superuser account for routine tasks. This helps in limiting the scope of potential damage if the account is compromised.

3c. Password Policy

Enforce strong password policies for superuser accounts. Require complex passwords with a combination of uppercase and lowercase letters, numbers, and special characters. Change passwords periodically to mitigate the risk of unauthorized access.

3d. Multi-Factor Authentication

Implement **multi-factor authentication (MFA)** for superuser accounts to add an extra layer of security. For example, in addition to a username and password, a user might need to enter a code from an authenticator app on a smartphone or key fob. This can prevent unauthorized access even if the password is compromised.

TERM TO KNOW

Multi-Factor Authentication (MFA)

A security measure that requires multiple authentication methods for a user to access a system.

3e. Location-Based Access

Limit access to superuser accounts by IP address or network range. Utilize firewall rules or database settings to restrict connections to computers on the internal local area network or from a certain network address.

3f. Audit Logging

Enable comprehensive audit logging for superuser activities. This allows tracking of all actions performed by superusers, aiding in identifying any suspicious or unauthorized activities.

3g. Encryption

Encrypt data at rest and in transit to protect sensitive information from unauthorized access. Use SSL/TLS for secure communication between clients and the database server.

3h. Enable Logging and Monitoring

Configure the database to log all superuser activity and monitor these logs regularly for any suspicious behavior.

3i. Review Privileges Regularly

Periodically review and audit the privileges assigned to superuser accounts. Remove unnecessary privileges and roles to minimize the potential impact of a security breach.

By implementing these best practices, you can significantly reduce the security risks associated with superuser accounts.

SUMMARY

In this lesson, you developed an **understanding of a superuser role** as an all-access pass to every part of a database system. This powerful role can wreak havoc on a database in the wrong hands, so the existence of **superusers poses a security risk**. You learned a number of ways to **protect against superuser misuse**, including **limiting who has superuser access**, applying the principle of least privilege when granting privileges to accounts; **separating duties**; implementing **password policies** and **multi-factor authentication** to make it harder for an attacker to sign into a superuser account; leveraging **location-based access**, limiting access to superuser accounts by IP address or network range; enabling comprehensive **audit logging** for superuser activities; **encrypting** data at rest and in transit; **enabling the logging and monitoring** of superuser activity; and **reviewing privileges regularly**, removing unnecessary privileges and roles to minimize the potential impact of a security breach.

Source: THIS TUTORIAL WAS AUTHORED BY DR. VINCENT TRAN, PHD (2020) AND FAITHE WEMPEN (2024) FOR SOPHIA LEARNING. PLEASE SEE OUR TERMS OF USE.

TERMS TO KNOW

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Principle of Least Privilege
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Superuser
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