Department of Computer Science & Engineering

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CSE6001: Advanced Database Systems

Database Privacy and Security: Concepts, Risks and Practices

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Abstract

This paper represents a extensive review of security measures in database systems, focusing on authentication, access control, encryption, auditing, intrusion detection, and privacy-enhancing techniques. It's focus to provide fresh perspective into the recent developments and recommended guidelines in securing databases. The review explores the obstacles, vulnerabilities, and risk reduction plans associated with database security. It examines a range of authentication approaches, access control models, encryption techniques, auditing and monitoring approaches, threat detection systems, and data breach prevention strategies. The paper additionally analyzes the implications of emerging trends such as cloud computing, big data database security. By surveying previous studies, this review seeks to further the development of database security and support organizations in protecting their valuable data.[2]

Introduction

Database security is a kind of collective measures which is required to protect as well securing the database from dishonest use. The purpose of this document is to focus on the violation of database security threats which can be overcome through database forensics that has become an important field of study. Database Security protects malicious threats and attacks. There are different methods for securing database and among these important are include access control, access authorization etc. Database Security is wide area and includes a multitude of processes, tools as well as methodologies keeps security within a database and allied environment. There are various risks found for the database security. These can be due to many reasons such as • Budget constraints • Lack of understanding of the threats • Lack of inter-departmental cooperation • Disconnect between IT operations and executive management team • Lack of formal database security processes and procedures • Too many IT personnel have "root" access to databases • Shortage of skilled security professionals • Conscious decision to focus elsewhere • Lacking in database security skills

Common Database Security Issues

Data corruption due to the entering invalid data and or commands, also mistake in the database can result weakness in database or repository systems. According to the NCC Group Study, UK following are the common database security issues.[1]

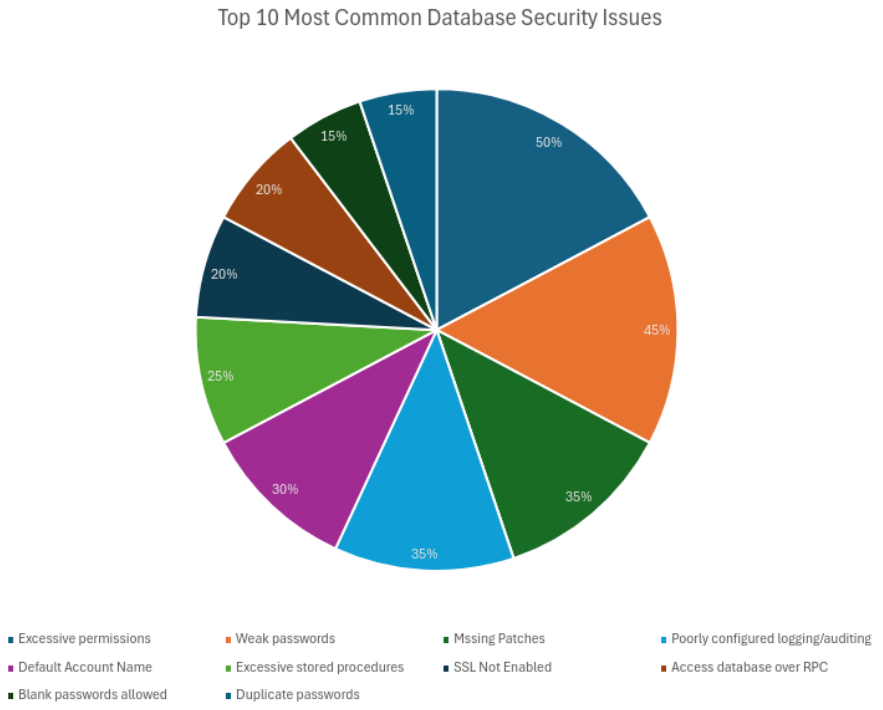
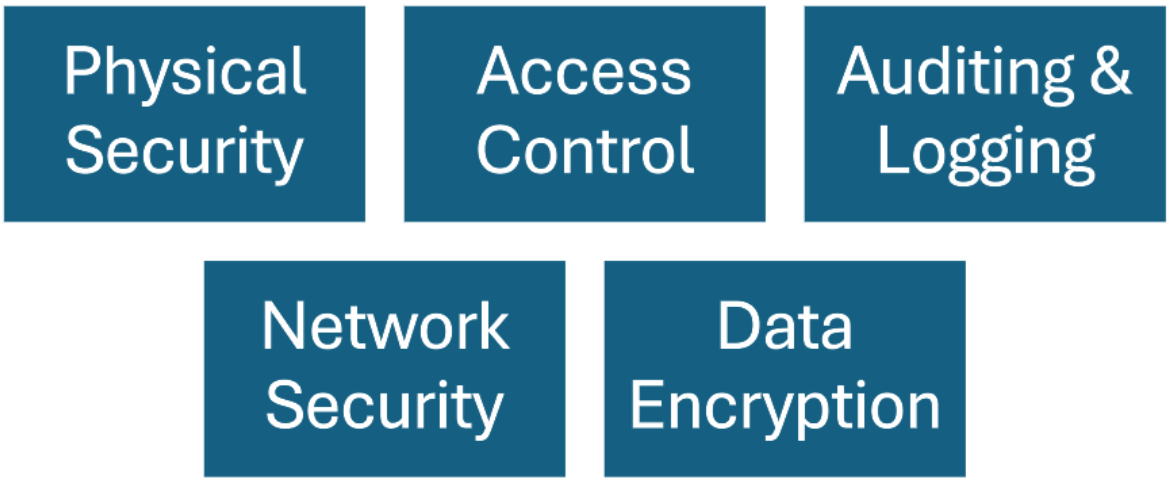


Figure 1: Some of the common Database Security Survey (NCC Group Survey, UK)

Types of Database Security



- **Physical Security:** Physical Security means protecting database from unauthorized access physical level. This means applying security in server rooms, monitoring who has previleges and enter the data center, and also using enough security cameras and alarming systems.
- **Access control:** Access control states that Implementing restrictions database access to authorized users only. It includes several key components, authentication, authorization.
- **Network Security:** Network Security implies preventing harm to the database from unauthorized access and keeping the database safe from network-based threats.

  There are several Key measures we can take like firewalls, intrusion detection systems, encryption, Virtual Private Networks, Access Control, Network Segmentation, Patch Management, Secure Network Protocols, DDoS Protection, Network Monitoring, User Education and Awareness, Zero Trust Security and so on.

References

[1] P. K. Paul, and P. S. Aithal, "Database Security: An Overview and Analysis of Current Trend"

[2] Habeeb O., and Maryam A., "A Comprehensive Review of Security Measures in Database Systems: Assessing Authentication, Access Control, and Beyond"