Database Security

Information Security

ArfanShahzadTech

WhatsApp-Contact Us
0345-5922495

ArfanShahzad.com

Course Outline

Course Name: Information Security
Credit Hours: 3(3-0)
Prerequisites: Data Communication and Computer Networks
Course Outline:
Basic notions of confidentiality, integrity, availability; authentication models; protection models; security kernels; Encryption, Hashing and Digital Signatures; audit; intrusion detection and response; database security, hostbased and network-based security issues operational security issues; physical security issues; personnel security; policy formation and enforcement; access controls; information flow; legal and social issues; identification and authentication in local and distributed systems; classification and trust modeling; risk assessment
Reference Materials:
1. *Computer Security: Art and Science*, Matthew Bishop
2. *Cryptography and Network Security* by William Stalling 6th Edition, 2012
3. *Principles of Information Security* 3rd E by Michael E. Whitman and Herbert J. Mattord

ArfanShahzadTech
WhatsApp-Contact Us
0345-5922495
ArfanShahzad.com

Database Security

- Database security refers to the ***protection of databases*** and the ***information stored*** within them from ***unauthorized access***, ***use***, ***disclosure***, ***disruption***, or ***destruction***.
- As databases are ***critical repositories*** of ***sensitive*** and ***valuable data***, **ensuring their security** is essential for maintaining the ***confidentiality***, ***integrity***, and ***availability*** of information.

ArfanShahzadTech
WhatsApp-Contact Us
0345-5922495
ArfanShahzad.com

Database Security cont…

- Database security **encompasses** a range of ***measures***, ***controls***, and ***practices*** that are implemented to **safeguard databases** from various ***threats*** and ***vulnerabilities***.
- These measures are designed to **prevent** ***unauthorized access***, ***detect*** and ***respond*** to ***security incidents***, and ***enforce data privacy*** and ***regulatory compliance***.
- Let's explore some key aspects of database security in more detail:

ArfanShahzadTech
WhatsApp-Contact Us
0345-5922495
ArfanShahzad.com

Database Security cont…

- **Access Control:** Access control is ***fundamental*** to database security.
- It involves the implementation of **authentication** and **authorization** mechanisms to ensure that ***only authorized individuals*** or ***applications*** can ***access the database*** and ***perform specific actions***.
- Access control includes user management, role-based access control (**RBAC**), and the principle of ***least privilege***, where users are ***granted only the necessary privileges*** to perform their tasks.

ArfanShahzadTech
WhatsApp-Contact Us
0345-5922495
ArfanShahzad.com

Database Security cont…

- **Encryption:** Encryption is a ***crucial technique*** for **protecting data** at ***rest*** and in ***transit***.
- It involves the use of ***cryptographic algorithms*** to **transform** ***sensitive data*** into an ***unreadable format*** that can only be ***decrypted*** with the ***appropriate encryption key***.
- Encryption can be applied at the **database level**, **column level**, or **file level**, providing an ***additional layer of protection*** against unauthorized access.

ArfanShahzadTech
WhatsApp-Contact Us
0345-5922495
ArfanShahzad.com

Database Security cont…

- **Data Masking and Redaction:** Data ***masking*** and ***redaction*** techniques are used to hide or obfuscate ***sensitive data*** ***within the database***, while still allowing it to be ***used for*** **testing**, **development**, or **reporting purposes**.
- **Masking** replaces sensitive data with ***realistic*** but ***non-sensitive values***, while **redaction** ***removes*** or ***replaces*** sensitive data based on ***predefined rules***, ensuring that only authorized users can view the original values.

ArfanShahzadTech
WhatsApp-Contact Us
0345-5922495
ArfanShahzad.com

Database Security cont…

- **Auditing and Monitoring:** Database auditing involves tracking and recording database activities, such as user logins, queries, modifications, and system events.
- Auditing enables the detection of suspicious or unauthorized activities and provides an audit trail for forensic investigations and compliance purposes.
- Real-time monitoring tools can analyze database logs and generate alerts for potential security incidents or policy violations.

ArfanShahzadTech
WhatsApp-Contact Us
0345-5922495
ArfanShahzad.com

Database Security cont…

- **Data Backup and Recovery:** Regular backups are crucial for database security.
- They ensure the availability and recoverability of data in the event of data loss, system failures, or security breaches.
- Backup strategies should include offsite storage, versioning, and periodic testing of restore processes to ensure the integrity of the backup data.

ArfanShahzadTech
WhatsApp-Contact Us
0345-5922495
ArfanShahzad.com

Database Security cont…

- **Vulnerability Management:** Regular vulnerability assessments and patch management are essential for addressing security weaknesses in the database software and underlying infrastructure.
- Vulnerability scanning tools can identify known vulnerabilities, misconfigurations, or weaknesses that could be exploited by attackers.
- Prompt patching and updates help mitigate these vulnerabilities and protect against known threats.

ArfanShahzadTech
WhatsApp-Contact Us
0345-5922495
ArfanShahzad.com

Database Security cont…

- **Data Privacy and Compliance:** Database security must comply with relevant data privacy regulations, industry standards, and organizational policies.
- This includes implementing measures to protect personally identifiable information (PII), sensitive financial data, or other regulated data.
- Compliance requirements may involve data encryption, access controls, audit trails, and privacy impact assessments.

ArfanShahzadTech
WhatsApp-Contact Us
0345-5922495
ArfanShahzad.com

Database Security cont…

- **Security Awareness and Training:** Human factors play a significant role in database security.
- Employees and database administrators should receive ongoing security awareness training to understand security risks, best practices, and the importance of protecting sensitive data.
- Training should cover topics such as password hygiene, social engineering awareness, and secure coding practices.

ArfanShahzadTech
WhatsApp-Contact Us
0345-5922495
ArfanShahzad.com

Database Security cont…

- Database security is a multifaceted discipline that requires a comprehensive approach to protect databases and the information they contain.
- It involves implementing strong access controls, encrypting sensitive data, monitoring for unauthorized activities, conducting vulnerability assessments, ensuring data privacy, and fostering a security-conscious culture.
- By employing robust database security measures, organizations can safeguard their data assets, maintain compliance, and mitigate the risks associated with data breaches or unauthorized access.

ArfanShahzadTech
WhatsApp-Contact Us
0345-5922495
ArfanShahzad.com