Week 12

Day 56

Android Pentesting

Android Penetration Testing (Android Pentesting) involves assessing Android applications and devices to identify security vulnerabilities that could be exploited by attackers. The goal is to find weaknesses in mobile applications, system configurations, and communication mechanisms and recommend measures to strengthen mobile security.

Tools Used

- **ADB (Android Debug Bridge):** A command-line tool used to communicate with Android devices or emulators for debugging and testing.
- **MobSF (Mobile Security Framework):** An automated framework for static and dynamic analysis of Android applications.

Practical Work Performed

- Studied the Android architecture, application components, and permission model.
- Used **ADB** to:
    - Connect to Android emulators
    - Access device logs and file systems
    - Install and uninstall applications for testing
- Used **MobSF** to:
    - Perform static analysis of APK files

    - Identify insecure permissions, hardcoded secrets, and weak cryptography
    - Conduct dynamic analysis to observe runtime behavior

- Analyzed vulnerabilities related to data storage, inter-process communication, and network communication.

Work Description

The topic of Android Pentesting was studied in detail as per the cybersecurity syllabus. All practical exercises were performed on authorized applications within a controlled lab environment, ensuring ethical and legal compliance. These activities provided hands-on experience in evaluating Android application security.

Conclusion

Android pentesting is essential for identifying vulnerabilities in mobile applications before they are exploited. Through hands-on practice using ADB and MobSF, practical understanding of Android security testing techniques was gained. This study emphasized the importance of secure coding practices, proper permission management, and regular security testing to protect Android applications and users.

Day 57

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Tools Used

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Practical Work Performed

i. Studied the Android architecture, application components, and permission model.

ii. Used **ADB** to:

  - Connect to Android emulators
  - Access device logs and file systems
  - Install and uninstall applications for testing

iii. Used **MobSF** to:

  - Perform static analysis of APK files
  - Identify insecure permissions, hardcoded secrets, and weak cryptography
  - Conduct dynamic analysis to observe runtime behavior

iv. Analyzed vulnerabilities related to data storage, inter-process communication, and network communication.

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Day 58

Cryptography

Cryptography is the practice of securing information by converting it into an unreadable format so that only authorized users can access it. It plays a vital role in protecting data confidentiality, integrity, authentication, and non-repudiation in digital communication and storage systems.

Tools Used

- **OpenSSL:** A cryptographic toolkit used to perform encryption, decryption, key generation, and certificate management.
- **Hashing Tools:** Used to generate hash values for verifying data integrity and password security.

Concepts Studied

- Symmetric encryption (AES, DES)
- Asymmetric encryption (RSA)
- Hashing algorithms (MD5, SHA-1, SHA-256)
- Digital signatures and certificates
- Secure communication protocols

Practical Work Performed

- Used **OpenSSL** to:
    - Generate public and private key pairs
    - Encrypt and decrypt files and messages

    - Create and verify digital certificates

- Used **Hashing Tools** to:
    - Generate hashes for files
    - Verify file integrity by comparing hash values
- Studied how cryptography is applied in real-world security systems such as HTTPS and secure authentication mechanisms.

Work Description

The topic of Cryptography was studied in detail as per the cybersecurity syllabus. All practical exercises were performed on authorized systems within a controlled lab environment, ensuring ethical and legal compliance. The practical tasks helped in understanding the application of cryptographic techniques for data protection.

Conclusion

Cryptography is a fundamental component of cybersecurity that ensures secure data transmission and storage. Through hands-on practice using OpenSSL and hashing tools, practical understanding of encryption, decryption, and integrity verification was gained. This study highlighted the importance of cryptographic algorithms in safeguarding sensitive information and maintaining trust in digital systems.

Day 59

Steganography

Steganography is the technique of hiding secret information inside ordinary digital files such as images, audio, or video files in such a way that the existence of the hidden data is not noticeable. Unlike cryptography, which protects the content of information, steganography focuses on concealing the presence of the information itself.

Tools Used

- **Steghide:** An open-source steganography tool used to embed and extract hidden data within image and audio files. It also supports encryption of the hidden data using a passphrase.

Concepts Studied

- Difference between steganography and cryptography
- Cover file, secret data, and stego file
- Embedding and extraction techniques
- Use of passphrases for added security
- Legitimate and malicious use cases of steganography

Practical Work Performed

- Used **Steghide** to:
  - Hide secret text files inside image files
  - Protect hidden data using a passphrase
  - Extract hidden information from stego files

- Observed changes in file size after data embedding.
- Studied how steganography can be combined with encryption for stronger security.
- Analyzed the challenges involved in detecting hidden data.

Work Description

The topic of Steganography was studied in detail as per the cybersecurity syllabus. All practical exercises were conducted in a controlled lab environment on authorized systems, ensuring ethical and legal compliance. The activities provided hands-on experience in concealing and retrieving information using steganographic techniques.

Conclusion

Steganography is an effective method for covert communication and data concealment. Through practical exercises using Steghide, a clear understanding of how data can be hidden and extracted from multimedia files was gained. This study highlighted both the importance of steganography in secure communication and the potential risks it poses when misused, emphasizing the need for awareness and detection mechanisms in cybersecurity.

Day 60

Malware Analysis

Malware Analysis is the process of examining malicious software to understand its behavior, functionality, and potential impact on systems and networks. The objective is to identify how malware operates, spreads, and compromises security, so that effective detection, prevention, and mitigation strategies can be implemented.

Tools Used

- **VirusTotal:** A malware scanning and analysis platform that checks files and URLs against multiple antivirus engines.
- **Metasploit Framework:** A penetration testing framework used to safely study exploit payloads and simulate malware behavior in a controlled environment.

Types of Malware Studied

- Viruses
- Worms
- Trojans
- Ransomware
- Spyware and Adware

Practical Work Performed

- Studied malware characteristics, infection methods, and impact on systems.
- Used **VirusTotal** to:
    - Scan suspicious files and URLs

    - Analyze detection reports and behavioral indicators

- Used **Metasploit** to:
    - Study payload behavior and exploitation techniques
    - Understand post-exploitation activities in a safe lab setup
- Observed how malware evades detection and persists on compromised systems.

Work Description

The topic of Malware Analysis was studied in detail as per the cybersecurity syllabus. All practical activities were performed on authorized systems within a controlled lab environment, ensuring ethical and legal compliance. These exercises helped in developing hands-on understanding of malware detection and analysis techniques.

Conclusion

Malware analysis is a crucial skill in cybersecurity defense and incident response. Through hands-on practice using VirusTotal and Metasploit, practical knowledge was gained in identifying malicious software, understanding its behavior, and analyzing its impact. This study emphasized the importance of proactive monitoring, secure environments, and continuous threat analysis to protect systems from malware attacks.