Mobile Application Threat Analysis

Ari Kesäniemi

Nixu
Thought Process for Discovering Threats

1. “What do we want to protect and why?”
2. “Where could the attack happen?”
3. “What could go wrong?”
4. “Do we have appropriate protection?”
5. “What is the risk we accept?”
1. “What do we want to protect and why?”

- What are the *assets* worth protecting?
- What would be the business impact if compromised?

- Data
- Money, privacy, credentials
- Transactions and processes
- IPR, innovations, algorithms
- Reputation, customer experience
- Resources
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2. “Where could the attack happen?”

- What is the *attack surface*?
- Local storage? (Including logs, caches etc)
- Connection to back end server?
- Connection to third party services?
- Malicious user?
- Web browsing and content handlers?
- Exposed API or RPC?
- Third party components part of the application?
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- What are the most feasible attack scenarios?
- How each of the assets (from step 1) could be compromised
  - Considering confidentiality, integrity, availability and non-repudiation for information assets?
  - Considering STRIDE* for processes and data flows?
  - Considering attack surfaces (from step 2)?
  - Considering the system as a whole?

* STRIDE = Spoofing / Tampering / Repudiation / Information disclosure / Denial of service / Elevation of privilege
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- Consider each scenario individually
- Is there a best practice protection mechanism? Is it implemented in the system?
- Build an attack tree when necessary

Legend

- Protection
- Attack Vector
- Objective

Disclosure of info
- Stolen ID
- Unauthorized use
- Eavesdropping
- Forged authz
- Local storage access
- Exploiting internal interfaces
- Modification of info
- MitM
- Sync modification from client to server
- Malicious health tips
- Modified app
- Stealing auth cred
- Exploiting unencrypted comms
- Phone call fraud
- Modified phone nr
- Identity theft
- Stolen session token
- Guessing or stealing password
- Physical access
- Application pin
- Server side attack
- Attack from another app
- Rooting device
- Secure session storage
- Local data encryption
- API protection
- Rerouting comms
- Publishing and refresh sync
- Faking app in app store
- SSL protection
- IP bound session
- Social engineering
OWASP Top Ten Mobile Risks (DRAFT)

1. Insecure or unnecessary client-side data storage
2. Lack of data protection in transit
3. Personal data leakage
4. Failure to protect resources with strong authentication
5. Failure to implement least privilege authorization policy
6. Client-side injection
7. Client-side DOS
8. Malicious third-party code
9. Client-side buffer overflow
10. Failure to apply server-side controls
... and:

- Abuse of client side paid resources
- Failure to properly handle inbound SMS messages
- Failure to properly handle outbound SMS messages
- Malicious / fake applications from app store
- Ability of one application to view data or communicate with other applications
- Switching networks during a transaction
- Failure to protect sensitive data at rest
- Failure to disable insecure platform features in application (caching of keystrokes, screen data)
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- What are the residual risks that can be accepted?
- Not every scenario is worth protecting
- For scenarios not having good protection, consider DREAD:
  - Damage
  - Reproducibility
  - Exploitability
  - Affected users
  - Discoverability
- Is there a known threat agent motivated to perform an attack?
Attack Tree

- Device or application PIN challenge
- Order sent by user is modified
  - Unauthorized use of the device
  - Man-in-the-middle attack
    - Modified application
      - Faking application in app store
      - Replacing application in device manually
      - Physical access to device
    - Reconfiguring communications routing
    - Server-side attack
      - Access to local configuration
      - Attack from another application
      - Attack in network
    - Data encryption
      - Exploiting unencrypted communications
      - TLS encryption
Summary & Conclusion
1. "What do we want to protect and why?"
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Questions?

Resources:
• OWASP Mobile Security Project
• ENISA: Top Ten Smartphone Risks
• Microsoft: STRIDE, DREAD