Cracking the Code of Mobile Application

PALADION

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Take Away for the day

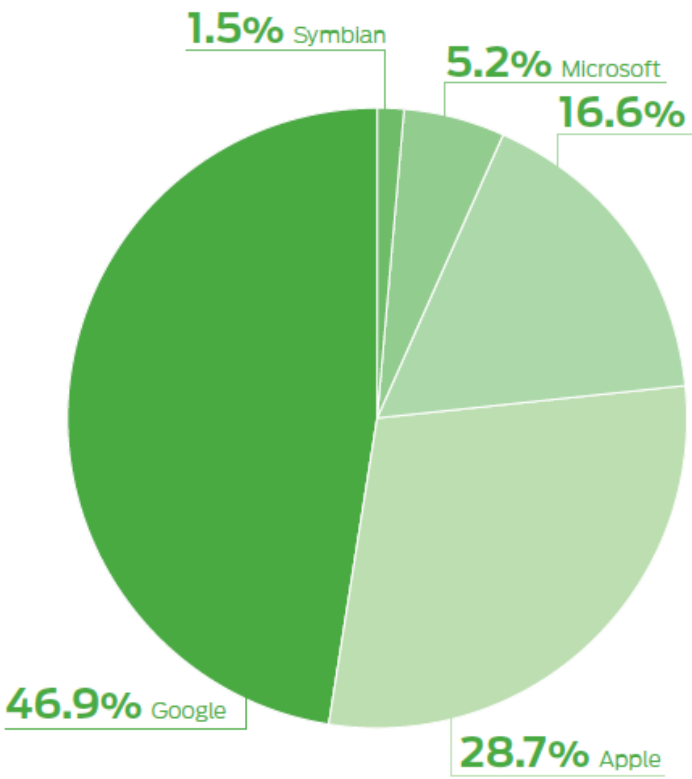
- Why Mobile Security?
- Purpose of Decompiling Mobile Applications?!
- Methodology of Decompilation
- Live Demo's:
  - Windows Phone App
  - Android App
  - iOS (iPhone / iPad App)
  - Blackberry Apps / Nokia App [Jar Files]
  - Blackberry Apps [COD Files]

Why is security relevant for Mobile Platform?

- 400% Increase in the number for Organizations Developing Mobile Platform based applications.
- 300% Increase in the no of Mobile Banking Applications.
- 500% Increase in the number of people using the Mobile Phones for their day to day transactions.
- 82% Chances of end users not using their Mobile Phones with proper caution.
- 79% Chances of Mobile Phone users Jail Breaking their Phones.
- 65% Chances of Mobile Phone users not installing Anti-virus on their Mobile Phones.
- **71% Chances of any application to get misused.**
- 57% Chances of a user losing his sensitive credentials to a hacker.

Market Statistics of Mobile Users

MARKET SHARE OF SMARTPHONE SUBSCRIBERS BY PLATFORM



KEY DATA COMMUNICATIONS INTERCEPTION FINDINGS

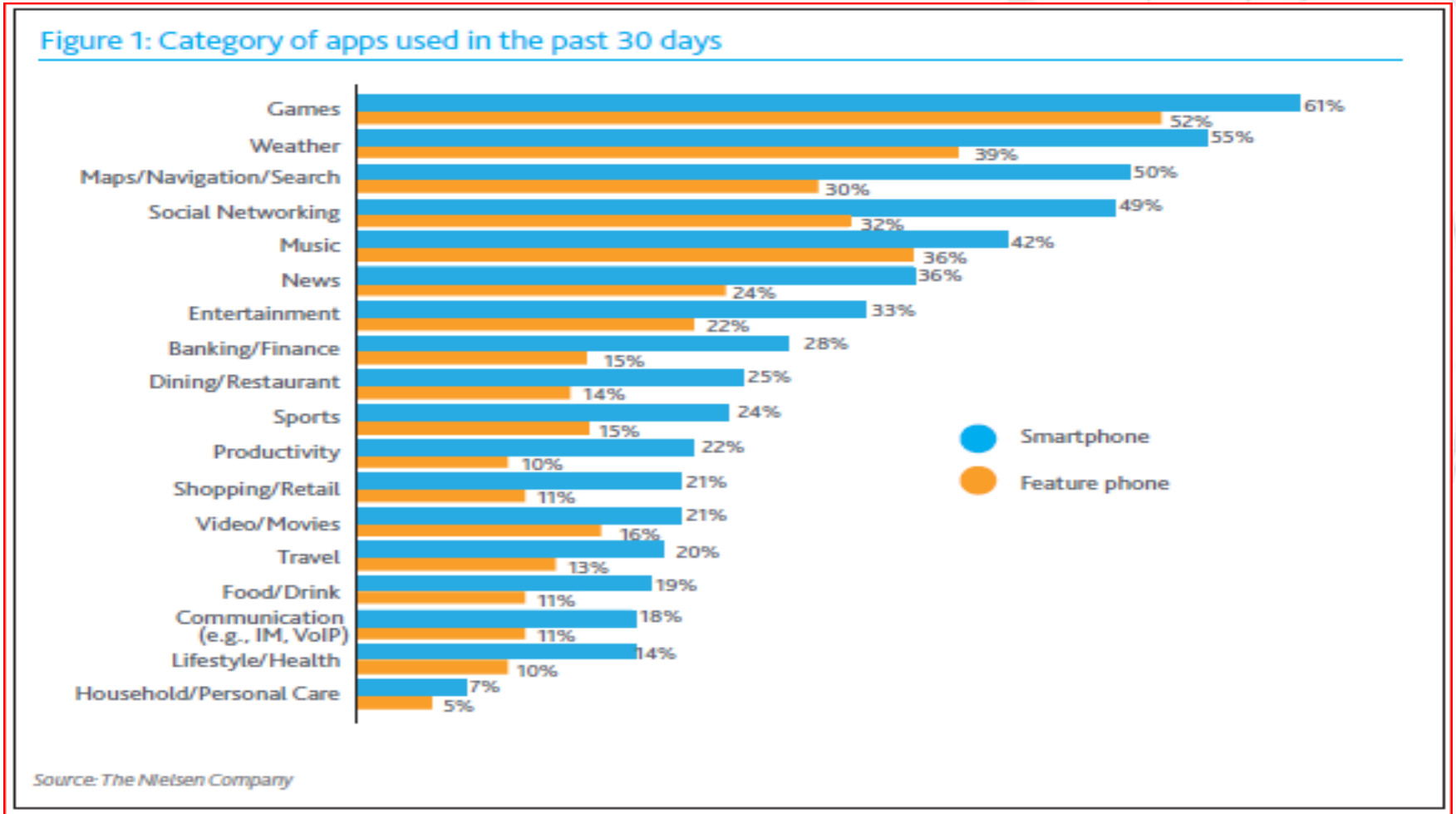
- Wi-Fi hotspots expected to grow 350 percent by 2015
- Widely available tools make it simple to hijack users' credentials from Wi-Fi networks

Table 2
Worldwide Smartphone Sales to End Users by Operating System in 1Q12 (Thousands of Units)

Operating System	1Q12 Units	1Q12 Market Share (%)	1Q11 Units	1Q11 Market Share (%)
Android	81,067.4	56.1	36,350.1	36.4
iOS	33,120.5	22.9	16,883.2	16.9
Symbian	12,466.9	8.6	27,598.5	27.7
Research In Motion	9,939.3	6.9	13,004.0	13.0
Bada	3,842.2	2.7	1,862.2	1.9
Microsoft	2,712.5	1.9	2,582.1	2.6
Others	1,242.9	0.9	1,495.0	1.5
Total	**144,391.7**	**100.0**	**99,775.0**	**100.0**

Source: Gartner (May 2012)

Mobile Market Trends



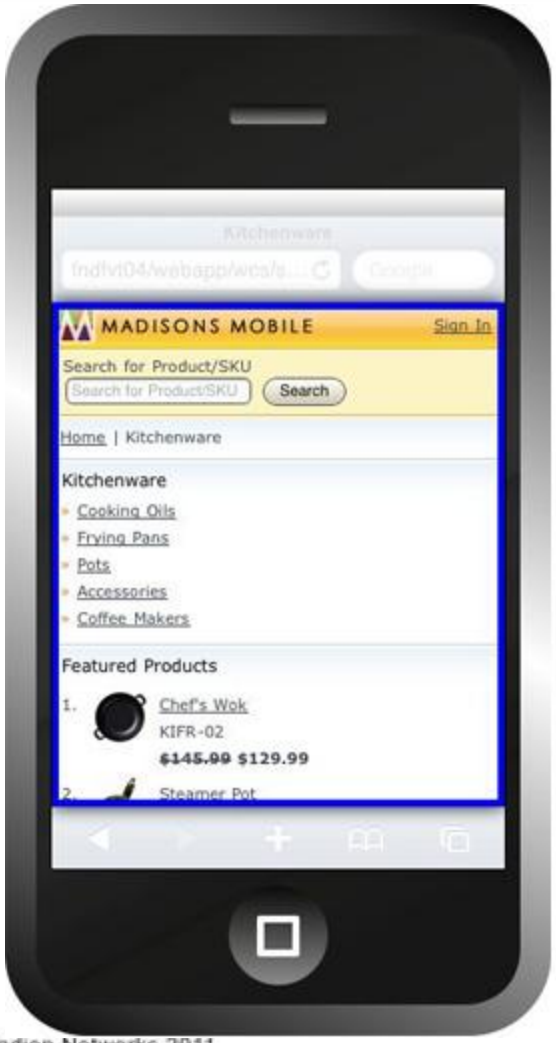
Different Types of Mobile Applications

- Mobile Browser based Mobile Applications
- Native Mobile Applications
- Hybrid Mobile Applications

Different Types of Mobile Applications

Different Types of Mobile Architecture

Browser App



Hybrid App

Why did we learn the above types??

- Which applications can be Decompiled?
  - Browser based Mobile Applications ?
  - Native Mobile Applications ?
  - Hybrid Mobile Applications ?

- We have to get to know of the **basics**!

Cracking the Mobile Application Code

Cracking the Mobile Application Code

- What do you mean by **Decompilation**? -> What is Compilation?
- What do you mean by **Reverse Engineering**?

Questions to be answered ahead:

- What are the **goals/purpose** of Cracking the code?

- What is the **methodology** of Decompilation?
- What the tools which can be used to Decompile?

- Can Decompilation be done on all **platforms**?
    1. WINDOWS PHONE / WINDOWS MOBILE ?
    2. ANDROID ?
    3. iPHONE / iPAD ?
    4. BLACKBERRY ?
    5. NOKIA ?

Goal of Cracking the Mobile Application Code

Goals of Cracking the Source Code

- "UNDERSTAND THE WORKING OF THE APPLICATION AND TO FIGURE OUT THE LOOPHOLES!"

- To find Treasure Key Words like: password , keys , sql, algo, AES, DES, Base64, etc

- Figure out the Algorithms Used and their keys.

- By-passing the client side checks by rebuilding the app.

- E.g. Password in Banking Application (Sensitive Information)
- E.g. Angry Birds Malware (Stealing Data)
- E.g. Zitmo Malware (Sending SMS)

- We have understood the goals, how to achieve them? Methodology.

Methodology of Cracking

Methodology / Study

Step 1	• Gaining access to the executable (.apk / .xap / .jar / .cod / .jad ..)
Step 2	• Understanding the **Technology** used to code the application.
Step 3	• Finding out ways to **derive the Object Code** from the Executable.
Step 4	• Figuring out a way to **derive the Class Files** from the Object Code.
Step 5	• Figuring out a way to **derive the Function Definitions** from the Object Code

JUMP TO DEMO's

Lets us understand the methodology in all platforms..

Demo - Reverse Engineer the Windows Phone Application

- **Tools** used:
  - -De-compresser (Winrar / Winzip / 7zip)
  - -.Net Decompiler (ILSpy)
  - -Visual Studio / Notepad

- **Steps**
  1. . xap -> .dll
  2. .dll -> .csproject

- **Demo**

- **Mitigation**
  1. Free Obfuscator (diff. to read): http://confuser.codeplex.com/
  2. Dotfuscator (program flow) : Link

Demo - Reverse Engineer the Android Application

- **Tools** used:
  - -De-compresser (Winrar / Winzip / 7zip)
  - -Dex2jar Tool (Command Line)
  - -Java Decompiler / Jar decompiler (JD-GUI, etc)

- **Steps**
  1. .apk -> .dex
  2. .dex -> .jar
  3. .jar -> .java

- **Demo**

- **Mitigation**
  1. Obfuscation Free Tool: http://proguard.sourceforge.net/

Demo - Reverse Engineer the Blackberry Application

- **Tools** used:
  - -JD – GUI (Java Decompiler)
  - -Notepad
- There are two types of Application files found in Blackberry:
  1. .Jar (.jad -> .jar)
  2. .Cod (.jad -> .cod (Blackberry Code Files)

- **Steps**
  1. .jar -> .java (JD-GUI) -> Notepad

  Or
  1. .cod -> codec Tool -> Notepad
- **Demo**
- **Mitigation**
  1. Obfuscation Free Tool: http://proguard.sourceforge.net/

Demo - Reverse Engineer the iOS Application

- **Tools** used:
  - -iExplorer
  - -Windows Explorer
  - -oTool
  - -Class-dump-z

- **Steps**
  1. .app -> Garbage (Object Code) (DVM)
  2. Object Code -> Class definitions

- **Demo**
- **Limitations:** Apple changes the IDE every release leading to challenges.
- **Mitigation**
  1. Obfuscation Free Tool: http://proguard.sourceforge.net/

Palisade Articles

- iOS vs Android Testing
- Mobile Data Encryption
- Mobile Application Security Testing
- Demystifying the Android Malware
- And …

- Website link: palizine.plynt.com

- Questions and Answers
- Quiz
- Feedback

Thank You

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