Hunting worms with honeypots

Philipp Seidel

DinoTools.de

29. November 2011

Table of contents

1. Introduction
2. Client Honeypots
3. Server Honeypots
4. Attacks and provided information
5. Conclusion
6. Questions

Malware?

- Malware short form for malicious software
- Intentionally harm an infected computer or computer system
- Example: worms, viruses, trojan horses, and many more

Trojan horses

- Application with a feature a user wants
- Does unwanted tasks in the background
- Functions
  - Spy on private data
  - Use it for further attacks
  - Open a backdoor
- Characteristic
  - No replications
  - No population growth
  - Parasitism

Virus

- Spread on execution
- Copy code into new host applications
- Sometimes spread by other malware e.g. trojan horses (Dropper)
- Functions
  - Delete or modify files
  - Break the system
- Characteristic
  - Replication
  - Population growth
  - Parasitism

Worm

- Uses networks and other ways to spread its self
- Infects the host system
- Independent from other applications
- Functions
  - Spreads automatically by E-Mail, ICQ, IRC, ...
  - Sometimes functions from other types of malware
- Characteristic
  - Replication
  - Population growth
  - No parasitism

Exploit

- Code/Program to exploit a system
- Used to document security bugs
- Functions
  - Exploit a system in combination with extra shellcode
  - Some worms use exploits

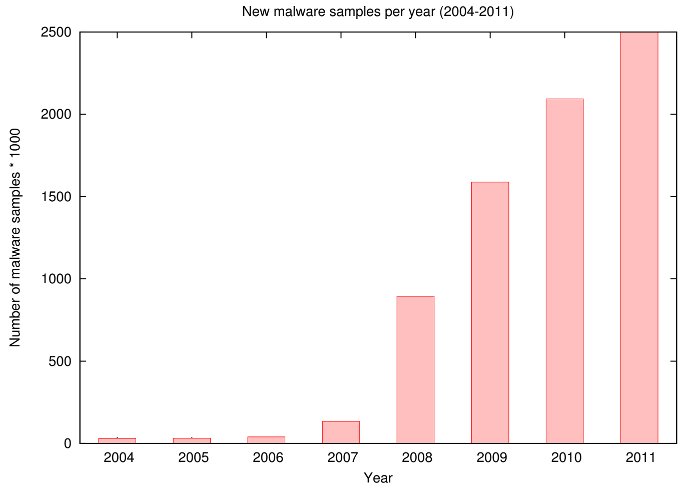
Shellcode

- Opcode generated by an assembler
- Can be executed directly on the CPU
- Sometimes in combination with exploits
- Functions
  - Download a malware or extra shellcode
  - Open backdoors

Further types

- Various combinations
- Hacker-tools (Viruskits)
- Rootkits
- ArcBombs
- Spyware
- Dialer
- RemoteAdmin

G Data Malware-Report



Honeypot

- Application or System
- Simulates services, networks or single applications and its behaviour

Client

- Acts like a desktop operating system or a single application
- Example: Browser

Server

Simulate ...

- Network services
- Computer networks
- Hardware (servers, routers, switches, printers, ...)

Honeypots - Classification by interaction

Low-Interaction

- Limited way for interaction
- Simulates only parts of a service, system, application
- Only functions to successfully run an attack against the honeypot

High-Interaction

- High interaction
- Real operating system
- All applications and services are not simulated
- Monitored from outside

PhoneyC

- Low-Interaction Client Honeypot
- Written in Python
- Framework to detect attacks against a client application
- Crawler functionality to download a web page or a web document
- Uses ClamAV to search for malware
- Execute dynamic content by using SpiderMonkey Engine
- Use vb2py to convert VisualBasic code into Python
- Detect buffer overflows while executing the code

Amun

- Low-Interaction Honeypot
- Used to capture malware
- Developed using Python
- Emulates various vulnerabilities

Dionaea

- Low-Interaction Honeypot
- Nepenthes successor
- Core in C, but module and extensions in Python
- Protocols are fully implemented
- libemu to detect shellcode
- Supported protocols: HTTP, TFTP, FTP, Mirror, SMB, EQMAP, SIP und MSSQL

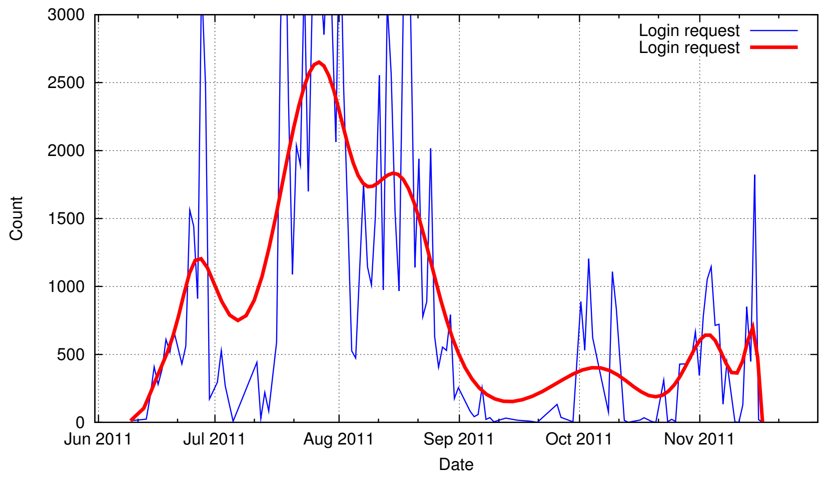
Dionaea - libemu

- Execute x86 opcode
  - Read x86 opcode
  - Emulate CPU registers and FPU
- Execute Shellcode
  - Use GetPC heuristics
  - Win32 Hooking

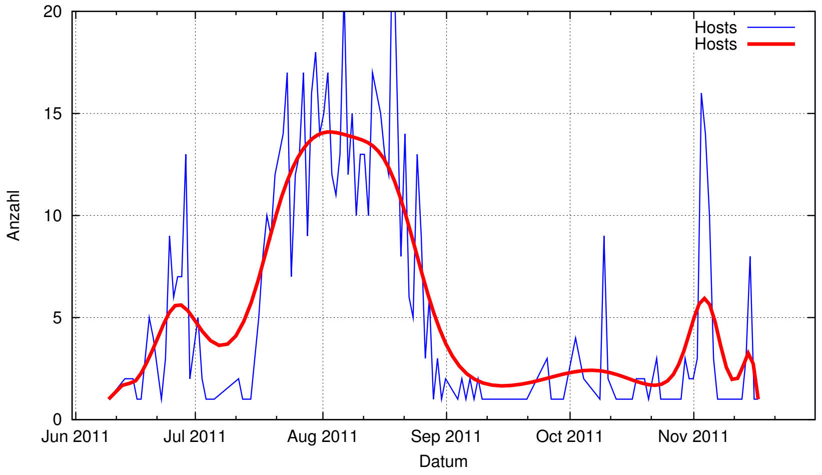
Kippo

- Low-Interaction Honeypot but called Medium-Interaction Honeypot by its developer
- SSH-Honeypot
- Developed in Python using the Twisted framework
- Attacker can do things in a sandbox
- Some applications are emulated or static files

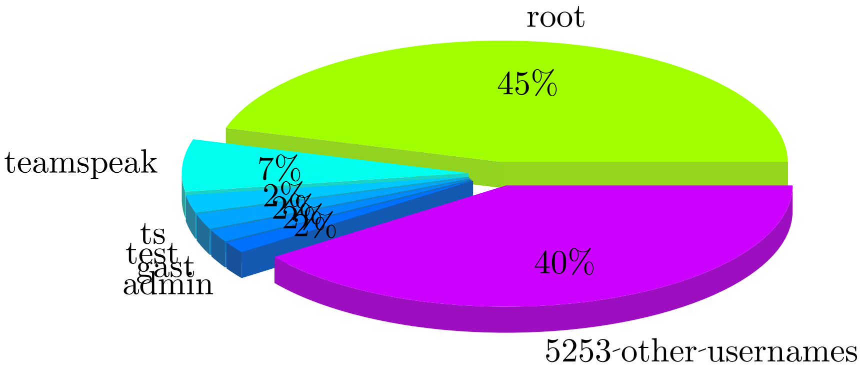
Kippo - Logins



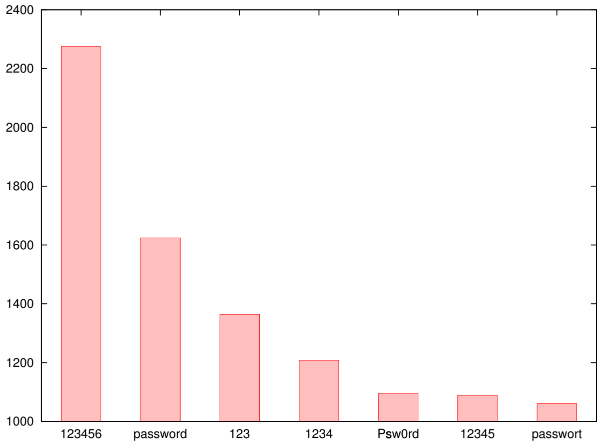
Kippo - Hosts



Kippo - Usernames

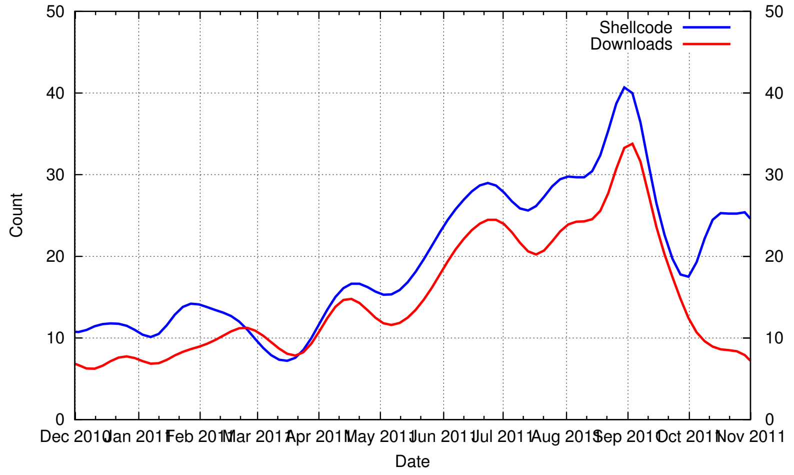


Kippo - Passwords

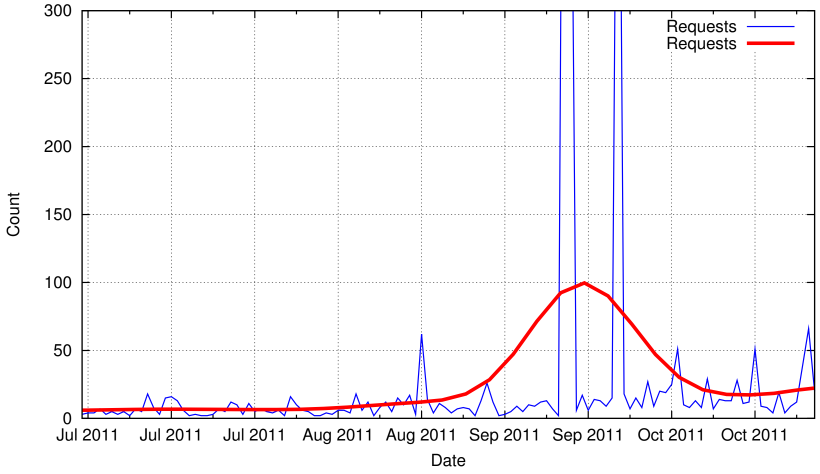


Out of 119859 login requests

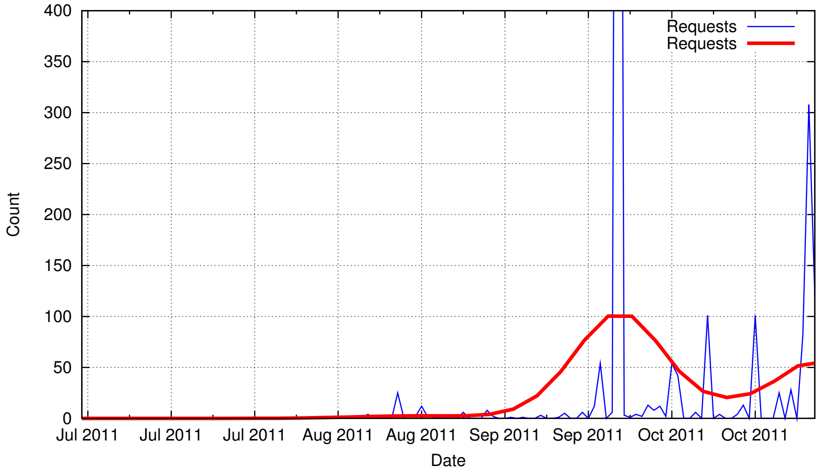
Dionaea - Attacks against the SMB Service



Dionaea - Sip Session



Dionaea - Sip Call



Analyze - Antivirus engine

- ClamAV
  - Open Source antivirus engine
  - Detects less malware than proprietary software
  - URL: `http://www.clamav.net/`
  - Submit new files: `http://cgi.clamav.net/sendvirus.cgi`
- VirusTotal
  - Online service to analyze suspicious files
  - Upload files to the service
  - About 39 AV products
  - URL: `http://www.virustotal.com/de/`
- MAVScan
  - MAVScan = Multi AntiVirus Scan
  - Open Source
  - Runs on the local system and is extensible
  - Supports 5 AV products
  - URL: `http://dev.dinotools.org/projects/mavscan`

Sandbox

- Upload a suspicious file
- Execute the file in a safe environment
- Monitor all system changes and actions (Network, Registry, Files, ...)
- Generate a report

- CWSandbox
  - Free Sandbox
  - Provided by University of Mannheim
  - URL: `http://mwanalysis.org/`
- Anubis
  - Free Sandbox
  - Provided by International Secure Systems Lab
  - URL: `http://anubis.iseclab.org`

Honeypots - Advantages/Disadvantages

Low-Interaction

- Advantages
  - Simple deployment
  - Lower security risks
- Disadvantages
  - Detects only known attacks
  - Detects 0-Day attacks in a limited manner

High-Interaction

- Advantages
  - Detects 0-Day attacks
- Disadvantages
  - Higher security risks
  - Deployment more challenging

How to start

- **Pay attention to the laws!!!**
- honeyd and nepenthes are packaged for Debian und Ubuntu
- PPA for Ubuntu: `https://launchpad.net/~honeynet`

Questions

Thank you for your attention

Are there any questions?