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Honeypots

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Ancient History

Sun Tzu, The Art of War, 500BC (v. Chr.)

All warfare is based on deception, Chapter 1

- when we are able to attack, we must seem unable
- when using our forces, we must appear inactive
- when we are near, we must make the enemy believe we are far away
- when far away, we must make him believe we are near

Modern Military/Gov Deception

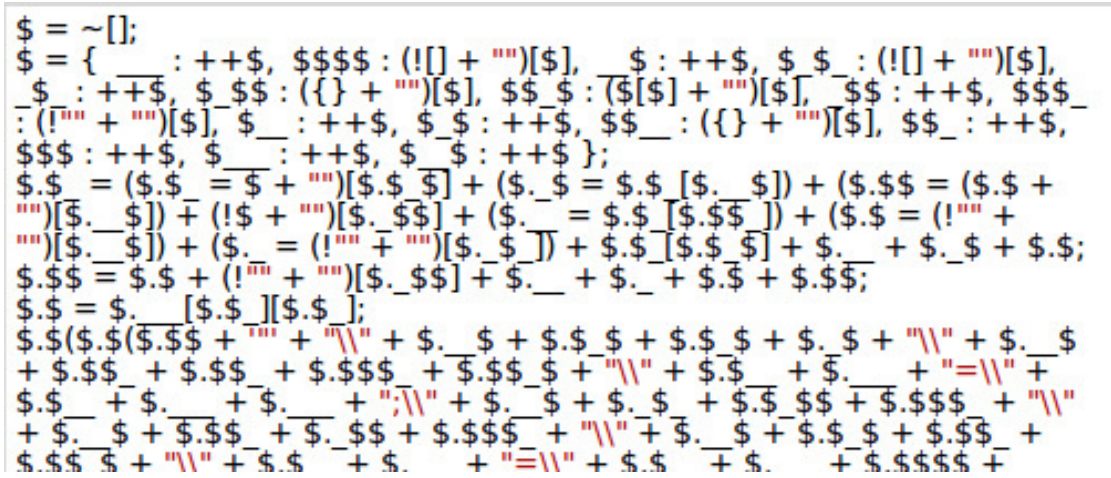
Militaries try deceive the enemy

- fake capability
- hidden capability
- counter intelligence
- manipulate information
- government spy vs spy

From Snowden leaks:
`https://archive.org/details/gchq-online-deception/`

Modern Cyber Deception

Criminals do it all the time



- anonymized IPs
- spoofed packets
- spoofed emails
- phishing websites
- malware - files intended to look harmless
- obfuscation - malicious javascript, polymorphic code

Security people do it a little bit...

- firewalls - hide hosts and ports
- split DNS - hide internal network
- security by obscurity ?!?! (moving ssh to port 2222, srsly?)

Honeypots are also a form of deception

Honeypots

Used in computer security

- detection
- intelligence
- investigation
- research

Deception by good guys (hopefully)

- fake computer systems
- fake networks
- fake services
- fake people
- operate at different OSI layers

High Interaction Honeypot

Intended to give attacker maximum functionality

- vulnerable OS or application
- unpatched, bad configuration
- no security software (firewall, AV)
- functional, real environment (but no real data)

Expected and allowed to be compromised

- can be a VM or physical machine
- directly exposed to the Internet
- monitored closely for attacks
- analyze the attack after its over

Attackers find it and break in

- find it by scanning or Shodan searches
- port scanning the whole Internet is trivial today

Low Interaction Honeypot

Intended to give attacker "perception" of functionality

- looks real, but is only a simulation
- OS network fingerprint is faked
- services are emulated, not real
- useful for automated scanning
- human attackers will quickly learn its fake

Safer more controlled honeypot environment

- installed as a honeypot application (honeyd, kippo)
- can impersonate large range of IPs from single machine
- link layer can answer arp requests for non-existent hosts

Sticky honeypots, or tarpits

- accept connections, but slow them way down, keep them alive
- lebrea - original tarpit daemon (named after a dinosaur park)
- endlessh - slow display of endless ssh banner

Spamtraps - Email Honeypots

For attracting spammers

- post/publish spamtrap email addresses in public forums/lists
- embed email addresses in html (machines see it, people don't)
- when spammers are harvesting addresses, they find your spamtrap address
- email to your spamtrap addresses can be analyzed, monitored
- good for anti-spam, and collecting new malware samples

Honeypot mail servers

- functional DNS, MX records, SMTP daemon
- look like normal servers that accept mail for delivery
- can act like open relays, but quarantine everything
- also good for infected client honeypots sending spam

Client Honeypots

Sometimes called honeybots or malware drones

- client machine is purposely infected with malware
- can be manual infection by malware analyst
- automated infection with client side honeypot farms
- can be virtual machines or physical machines

Used for malware analysis and malware research

- mitm for traffic analysis
- monitor botnet communication
- memory dumps of infected machine
- filesystem forensic analysis

Depending on the malware, may refuse to infect under some criteria (region, machine type, user environment, etc.)

Botnet Sinkholes

Honeypot for a whole botnet

- "fake" Command and Control (C&C or C2) server
- taking control of botnet's C2 server or DNS domain
- DGA (Domain Generation Algorithm) predicted, future DNS domain(s) registered in advance
- all infected bots connect to sinkhole server

Botnet herder (owner) loses control

- part of police assisted action (siezed domain or server)
- security researchers finding vulnerabilities in botnet
- can also be criminals steeling control from other criminals

abuse.ch and shadowserver.org are good resources

Internal Routing/DNS Sinkholes

Sinkhole servers, honeypots for internal infrastructure security

- organizations must use strict proxy access to Internet
- no NAT or routed traffic, everything configured via proxies
- no DNS resolution for external names, all via proxies
- internal default route sends external traffic to sinkhole
- internal DNS queries for external domains resolve to sinkhole

All internal PCs attempting non-proxy external connections or DNS resolution are suspicious

- no false positives, all sinkhole hits are attempts to bypass proxy
- can detect malware in the process of infection (direct attempts to fetch loaders, contact botnet C2)
- detect rogue software installations and misconfigured machines
- detect attempted data exfiltration, covert tunnelling

Honeynets

Honeypots can be managed in groups of machines or IPs

- called honeynets or honeypot farms
- can be client or server honeypots
- can be distributed across many ISPs/Hosters around the world
- can be on a single large range of IP addresses

For single large IP range

- single honeypot machine can simulate entire IP range
- useful for passive listening for Internet scanning activity

For globally distributed honeypots

- have a better view of Internet, not geo-fenced
- observe regional targeted scanning

Honey Links

Web links that are visible to machines but not people

- can be embedded in html pages, single transparent pixel
- crawlers find it, humans don't

Robots exclusion standard

- made to instruct visiting search engines
- ROBOTS.txt file lists forbidden directories
- special directories (honey links) can trigger response
- attackers, pentesting tools, and nasty search engines will find them, visit them

Website Tracking (fyi, use Privacy Badger, ad blockers)

- 3rd party tracking bugs
- social media "share" icons are spying on visitors
- analytics sites gather info, match with past cookie data

Tracking Bug Honeypots

Link usually sent via email

- also called webbugs or beacons
- used by advertising and marketing companies
- used by spammers, and criminals to distribute malware
- can be used by investigators and researchers

Web links are embedded in html mail or documents

- when opened, the client visits a honeypot
- fetches a single pixel transparent gif
- not visible to user, but honeypot server gets information about IP, browser/client, OS, etc.
- can trigger additional information gathering

Not limited to html images, can also be DNS, reverse-DNS, calendar invites, other application protocols

Exit Node Honeypots

Anonymization

- TOR (The Onion Router) - cryptographic system for anonymizing network traffic
- anonymizers and relays are dedicated servers (or tiers of servers) to mask IP source addresses
- designed to hide the identity of the originating machine at the network layer
- but not anonymizing the upper layers (session, application)

These services have exit nodes connecting to final destination

- anyone can create a relay or an exit node honeypot
- including criminals, researchers, other agencies
- original IP is gone, but the rest of the traffic can be analyzed or manipulated
- more interesting in the days when nobody used encryption

Other Honeypots

Honey phones or honey mobiles

- infecting phones with mobile malware, rogue apps
- make/accept voice calls, SMS messages
- social engineering

Honey docs

- specially prepared documents for attacker to find
- contain false or deceptive information
- contain malware or other malicious content

Honey people

- fake user acccounts
- social media profiles (linkedin, facebook)
- get access to contacts, content, communities

Legal Risks with Honeypots

What if somebody uses your honeypot to commit a serious crime?

- are you an accomplice to criminals who use your honeypot?
- maybe the attacker is spamming, or participating in a DDOS attack, but what if the damage is more severe?
- child exploitation, unauthorized ebanking access to steal money, or a terrorist communication channel?
- You can't say you were not aware, you built it fully expecting to have nasty people attacking it!

Which jurisdictions are involved? That is important!

- the country where you are
- the country where your honeypot is hosted
- the country where relayed attacks are targeting people

Depending on the crime and jurisdiction, an international legal process may be started

Any Questions?

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Thanks for listening!

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