Sécurité des applications WEB

Philippe BITON
pbiton@prox-ia.com
Twitter: @proxia

Objectifs

- Présenter la problématique globale de la sécurité applicative
- Proposer des définitions et homogénéiser le vocabulaire du domaine.
- Brosser le panorama des principales vulnérabilités
- Se familiariser avec les outils
- Découvrir les principaux scénarii d’attaques

Aspects logistiques

une session de présentation... une session d'échange n'hésitez pas à poser des questions!

les horaires : **9h40 - 12h50 et 13h40 - 16h50**

une pause en milieu d'intervention, le matin et l'après-midi

pour me joindre : pbiton@prox-ia.com

merci de bien vouloir mettre vos portables en mode vibreur

Faisons connaissance…

- Philippe BITON (pbiton@prox-ia.com)
- Corporate Software Security Officer à Gemalto
- Environ 20 ans dans l'ingénierie logicielle
  - 10 ans de développement logiciel en société de services
  - 10 ans à Gemalto (anciennement Gemplus)
    - Dans l'architecture logicielle des serveurs
    - Dans le développement d'applications Web
    - Dans l'intégration des serveurs dans les environnements des clients

…dans le domaine de la sécurité: CISSP 2010, CEH 2012, ISO 27005 Risk Manager (2014), SANS GIAC MOB (2016), …

La sécurité c'est

- Une impression
- Et une réalité

- C'est aussi un échange finalement
  - Installation d'une alarme à la maison CONTRE de l'argent
  - Loi liberticide contre le terrorisme CONTRE la perte de libertés fondamentales

Biais cognitifs

- **Le biais de la disponibilité en mémoire**: Le *biais de la disponibilité* en mémoire consiste à porter un jugement sur une probabilité selon la facilité avec laquelle des exemples viennent à l'esprit.
- **Le biais de confirmation**: Le *biais de confirmation* est la tendance, très commune, à ne rechercher et ne prendre en considération que les informations qui confirment les croyances et à ignorer ou discréditer celles qui les contredisent.
- **Le biais de croyance**: Le *biais de croyance* se produit quand le jugement sur la logique d'un argument est biaisé par la croyance en la vérité ou la fausseté de la conclusion. Ainsi, des erreurs de logique seront ignorées si la conclusion correspond aux croyances.
- **Le biais de statu quo**: Le *biais de statu quo* est la tendance à préférer laisser les choses telles qu'elles sont, un changement apparaissant comme apportant plus de risques et d'inconvénients que d'avantages possibles.
- **L'illusion de contrôle**: L'*illusion de contrôle* est la tendance à croire que nous avons plus de contrôle sur une situation que nous n'en avons réellement.
- **L'effet de simple exposition**: L'*effet de simple exposition* est une augmentation de la probabilité d'un sentiment positif envers quelqu'un ou quelque chose par la simple exposition répétée à cette personne ou cet objet.

Source: http://www.psychomedia.qc.ca/psychologie/biais-cognitifs

- Est-ce que cet échange vaut la peine?
  - On décide d'envahir l'Irak
    - Est-ce que le monde est plus sûr parce que Saddam Hussein n'est plus la?
    - Est-ce que cela valait l'échange ? Soldats, civils morts, argent, temps
- C'est en termes d'échanges que l'on pense la sécurité
- Mais on a souvent ni tort, ni raison
  - Certains ont des systèmes d'alarmes, d'autres non
    - Cela dépend de l'endroit où on habite
    - De ce que l'on souhaite protéger (des œuvres d'art…)
    - Si on a des enfants
    - …de notre « appétit au risque »

- On fait ces échanges sans s’en rendre compte parfois
  - Je mange le repas qui m’est servi au restaurant
  - Le lapin qui s’enfuit lorsqu’il voit un renard
    - Ceux qui sont bons avec les échanges survivent, les autres non
- Nous sommes l’espèce dominante, nous sommes donc bons pour ces échanges
- Hum…

- Nous réagissons à l'impression de sécurité, pas à la réalité
- Et ça marche car souvent Impression=Réalité

- Mais on trouve plusieurs tendances dans la prise de risques:
  - On exagère les risques rares ou spectaculaires et on minimise les risques courants (avion versus voiture)
  - L'inconnu est perçu comme plus risqué que ce qui est familier (pour un enfant, être kidnappé par un inconnu est moins probable que par un parent)
  - Les risques personnifiés sont perçus comme plus grands que les risques anonymes (Ben Laden)
  - On sous-estime les risques dans les situations que l'on contrôle et on les minimise quand on ne les contrôle pas (fumer versus le terrorisme)

- Quelques autres tendances, cognitives
  - Nous estimons la probabilité de quelques choses en fonction de notre capacité à concevoir des exemples
    - Si on entend parler de beaucoup d'attaques de tigres, il doit y en avoir beaucoup dans le coin
  - Ca fonctionne jusqu'à ce qu'on invente les journaux
    - Les journaux répètent encore et encore des risques rares
    - Quand quelque chose est courant ce n'est plus de l'information (accident de voiture, violence domestique,…)
  - 1, 2, 3, beaucoup
    - 1/ 1.000.000 et 1/1.000.000.000 n'arrivent presque jamais

- Les tendances cognitives agissent comme des filtres
  - Impression <> Réalité
  - On se sent en sécurité et on ne l'est pas
  - On se sent en danger et on ne l'est pas
- Une entreprise peut donc
  - Donner aux gens une impression de sécurité et espérer qu'ils ne s'en aperçoivent pas
  - Mettre les gens réellement en sécurité et espérer qu'ils le remarquent
- Comment les gens remarquent, eh bien en les éduquant:
  - Comprendre les risques, les menaces, les contre-mesures

- Si vous ne comprenez pas les risques alors vous ne comprenez pas les coûts, et vous faites de mauvais échanges
  - Si les actes terroristes se produisent rarement, il est quasiment impossible de juger des contre-mesures (c'est pourquoi on sacrifie encore des animaux, on cherche des cornes de licorne, et ca marche)

- Les peurs, les croyances populaires sont également des tendances cognitives,
- C'est un modèle inadéquat de la réalité

La sécurité c'est plutôt…

- Une impression
- Et un modèle
- Et une réalité

} Dans nos têtes { Basés sur l'intuition / Basé sur la raison

Dans le monde extérieur

- Le modèle n'est pas nécessaire dans un monde primitif
- Mais dans un monde complexe « oui »
  - Pour comprendre les microbes il faut un modèle, une représentation intelligente de la réalité, limité par la science et la technologie (on peut faire une thèse sur un virus sans avoir inventé le microscope pour les voir)
  - Le modèle l'emporte malgré tout sur l'impression

Les modèles viennent…

- Des élus
  - Terrorisme, enlèvement d'enfant, sécurité aérienne
- De l'industrie
  - Caméras de surveillance, pièces d'identité
- De la science
  - Cancer, grippe aviaire

- Ces modèles sont filtrés par les medias…

Les modèles changent…

- L'éléctricité
  - Il y a 100 ans, on avait peur de sonner aux portes
  - Aujourd'hui on change nous-mêmes les ampoules

- Le risque sur internet
  - Comment nos parents abordent la sécurité par rapport à nous?
  - Et que ferons nos enfants?

Les modèles changent…

- Les modèles finissent par devenir intuitif, ce qui est synonyme de familier (le modèle se rapproche de nos impressions)
- Quand le modèle est proche de la réalité et qu'il converge avec nos impressions, alors on ignore qu'il est là

Nous avons l'impression, le modèle, la réalité…

- Mais la réalité dépend de l'observateur
- Les décisions en sécurité sont prises par des gens très différents comme les actionnaires qui ont leurs propres échanges
- C'est de la politique:
  - Se convaincre de préférer un modèle à un autre
  - Se convaincre d'ignorer un modèle et de se fier à nos impressions
  - Marginaliser les gens qui ont un modèle que l'on aime pas

- Le risque du tabac est un bon exemple qui montre comment l'industrie du tabac combat un modèle qu'elle n'aime pas

Une autre tendance cognitive…

- La confirmation
  - Nous acceptons les données qui confirment notre modèle
  - Nous rejetons les données qui contredisent notre modèle
- On peut donc ignorer des preuves flagrantes
- Les modèles sur de longues périodes sont difficiles à intégrer
  - Le réchauffement climatique

- Les évènements « flash » qui génèrent beaucoup d'émotion peuvent également créer un modèle (le 11 septembre)

- Dans un monde technologique, on compte sur les autres pour juger de modèles pour lesquels on n’a pas les compétences
  - On accepte que le toit ne va pas s’effondrer sur notre tête sans vérifier nous-mêmes
  - On accepte de prendre l’avion, le train sans vérifier nous-mêmes

- Permettre aux gens d'adhérer à un modèle c'est:
  - Modifier leurs impressions (c'est de la manipulation)
  - Modifier le modèle mais c'est long (le tabac a pris 40 ans)

Quelques illustrations pour conclure

- Le Tylenol (aux US)
  - 1 mort
  - Des imitateurs
  - Peu de risque mais les gens avaient peur
  - L'industrie des médicaments « scellés » est inventé

- Un bébé naît à l'hôpital
  - Avec bracelet et puce RFID pour le bébé et pour la mère
  - Probabilité d'enlèvement de bébé en hôpital est proche de 0

Librement inspiré d’une conférence de Bruce Schneier à TED (https://www.ted.com/talks/bruce_schneier?language=fr)

Schneier on Security: https://www.schneier.com/

TED
Talks

Who are these guys?

Aiden Pierce

Marcus Holloway

We are now less valuable than the data you produce…

Are hackers freedom's last line of defense?

- City OS program: surveillance and security
- 64 billions connected devices in US (IOT)
- Build your digital profile
- Toys study your children
- Appliances, consoles and home security systems are windows in your private life
- Control of vehicules
- Control of mobiles
- Insurance company monitor your life habits to limit and deny coverage
- Health providers determine if your cancer is worth treating
- Search results and newsfeed influence your vote

2015 - vTech hack

- Motherboard revealed that a hacker broke into the servers of VTech. Inside the servers, the hacker found the names, email addresses, passwords, and home addresses of 4,833,678 parents, and the first names, genders and birthdays of more than 200,000 kids (photos and audio records).
- http://motherboard.vice.com/read/hacker-obtained-childrens-headshots-and-chatlogs-from-toymaker-vtech

2017 - Trump acknowledges Russia role in U.S. election hacking

- http://www.reuters.com/article/us-usa-russia-cyber-idUSKBN14S0O6
- A U.S. intelligence report last week said Putin directed a sophisticated influence campaign including cyber attacks to denigrate Democratic presidential candidate Hillary Clinton and support Trump.

2014 - 17 People Who Were Fired For Using Facebook

- http://www.businessinsider.com/17-people-who-were-fired-for-using-facebook-2014-7?IR=T

- Ashley Johnson, a 22-year-old North Carolina waitress, blasted two customers over Facebook for stiffing her on the tip and keeping her late. She also took the time to mention her workplace by name.
- She was fired for breaking a rule about disparaging customers.

2016 - Mirai Botnet Linked to Dyn DNS DDoS Attacks

- https://krebsonsecurity.com/2016/10/hacked-cameras-dvrs-powered-todays-massive-internet-outage/
- Some of the infrastructure responsible for the distributed denial-of-service (DDoS) attacks against Dyn DNS were botnets compromised by Mirai malware.
- Mirai botnets were previously used in DDoS attacks against security researcher Brian Krebs' blog "Krebs On Security" and French internet service and hosting provider OVH.
- Mirai malware targets Internet of Things (IoT) devices like routers, digital video records (DVRs), and webcams/security cameras, enslaving vast numbers of these devices into a botnet, which is then used to conduct DDoS attacks.

Shodan

- https://www.shodan.io/

- Explore / Top Voted / default password / password / webcam
  http://24.184.65.185:5000/Top
- http://74.235.130.35/fr/index.html

DDOS attack

- http://map.norsecorp.com/#/ (on Firefox)
- 2015 - DDoS-for-Hire Services Cheap But Effective - http://www.securityweek.com/ddos-hire-services-cheap-effective

2016 - The Jeep hackers are back to prove car hacking can get much worse

- https://www.wired.com/2016/08/jeep-hackers-return-high-speed-steering-acceleration-hacks/
- Almost exactly a year ago, Chrysler announced a recall for 1.4 million vehicles after a pair of hackers demonstrated to WIRED that they could remotely hijack a Jeep's digital systems over the Internet
- At the Black Hat security conference later this week, automotive cybersecurity researchers Charlie Miller and Chris Valasek will present a new arsenal of attacks against the same 2014 Jeep Cherokee they hacked in 2015
- Last year, they remotely hacked into the car and paralyzed it on highway I-64—while I was driving in traffic. They could even disable the car's brakes at low speeds.
- By sending carefully crafted messages on the vehicle's internal network known as a CAN bus, they're now able to pull off even more dangerous, unprecedented tricks like causing unintended acceleration and slamming on the car's brakes or turning the vehicle's steering wheel at any speed

2016 - Hackers broadcast live footage from hacked webcams on YouTube

- https://blog.kaspersky.com/2ch-webcam-hack/11961/
- This man streamed video from the hacked computers on YouTube. The anonymous user turned these sessions into a real online show. For example when a handful of victims approached their computers, he opened up a pornographic video in the browser right when they came close to their devices.

2016 - Apple Watches banned from Cabinet after ministers warned devices could be vulnerable to hacking

- http://www.telegraph.co.uk/news/2016/10/09/apple-watches-banned-from-cabinet-after-ministers-warned-devices/
- They could be used by hackers as listening devices.

2015 - Cyberattack that have exposed medical data

- Health insurer Premera Blue Cross said on Tuesday it was a victim of a cyberattack that may have exposed medical data and financial information of 11 million customers, in the latest serious breach disclosed by a healthcare company.
- http://www.huffingtonpost.com/2015/03/17/premera-blue-cross-cybera_n_6890194.html

- http://www.informationisbeautiful.net/visualizations/worlds-biggest-data-breaches-hacks/ (on Chromium)

The technology context

- https://www.netmarketshare.com
- Operating Systems
  - Desktop / Desktop versions
  - Mobile / Mobile Versions
- Search Engines
  - Desktop

- The Cloud
  - Demo: BucketFinder


WARNING !
O NOT TOUCH
THORIZED PERSONEL ONLY
Google™
WARNING
CAUTION
HIGH VOLTAGE
WARNING
WARNING
DO NOT TOUCH
THIS COMPUTER !
VIOLATORS WILL BE SHOT
SURVIVORS WILL BE HUNTED

WARNING: hacking is not a game….

12 novembre 2010:
David Kernell le hackeur
du compte de Sarah Palin
(septembre 2008)
condamné à 366 jours de
prison

Source: NakedSecurity - **http://nakedsecurity.sophos.com/**

WARNING: hacktivism can lead to jail….

15 novembre 2013:

LulzSec hacker Jeremy Hammond was sentenced to 10 years in prison for a violation of the Computer Fraud and Abuse Act, for having broken into the private security firm Stratfor's computers and leaking their emails to WikiLeaks

The documents Hammond leaked detailed private companies' surveillance of activists across the globe

2014 - GoToFail explained

About the security content of iOS 7.0.6

This document describes the security content of iOS 7.0.6.

iOS 7.0.6

- **Data Security**

  Available for: iPhone 4 and later, iPod touch (5th generation), iPad 2 and later

  Impact: An attacker with a privileged network position may capture or modify data in sessions protected by SSL/TLS

  Description: Secure Transport failed to validate the authenticity of the connection. This issue was addressed by restoring missing validation steps.

  CVE-ID

  CVE-2014-1266

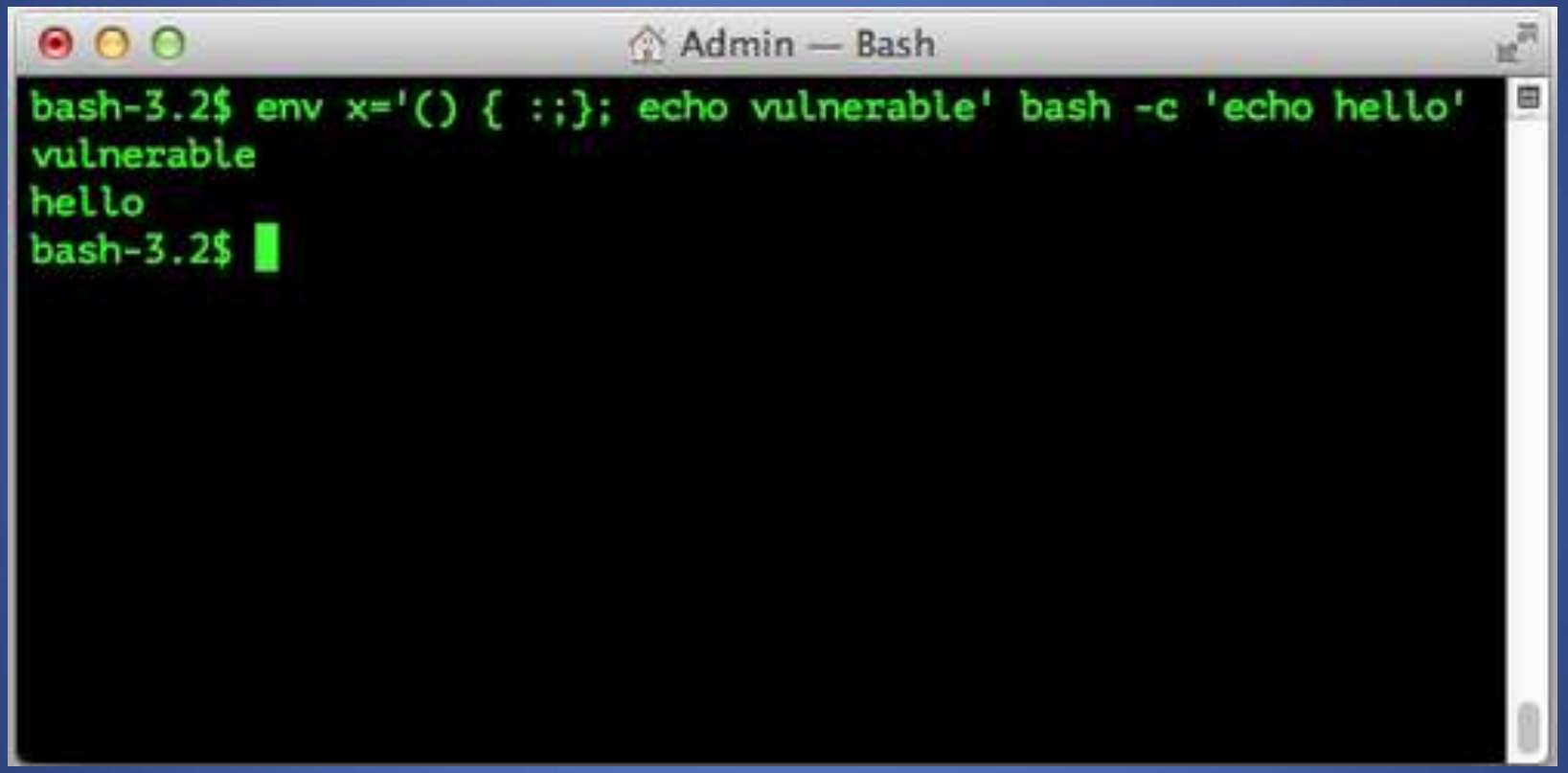
GoToFail explained

```
static OSStatus
SSLVerifySignedServerKeyExchange(SSLContext *ctx, bool isRsa, SSLBuffer signedParam
                                 uint8_t *signature, UInt16 signatureLen)
{
    OSStatus        err;
    ...

    if ((err = SSLHashSHA1.update(&hashCtx, &serverRandom)) != 0)
        goto fail;
    if ((err = SSLHashSHA1.update(&hashCtx, &signedParams)) != 0)
        goto fail;
        goto fail;
    if ((err = SSLHashSHA1.final(&hashCtx, &hashOut)) != 0)
        goto fail;
    ...

fail:
    SSLFreeBuffer(&signedHashes);
    SSLFreeBuffer(&hashCtx);
    return err;
}
```

2014 - Shellshock explained



2014 - Shellshock explained

CVE-2014-6271 & CVE-2014-7169

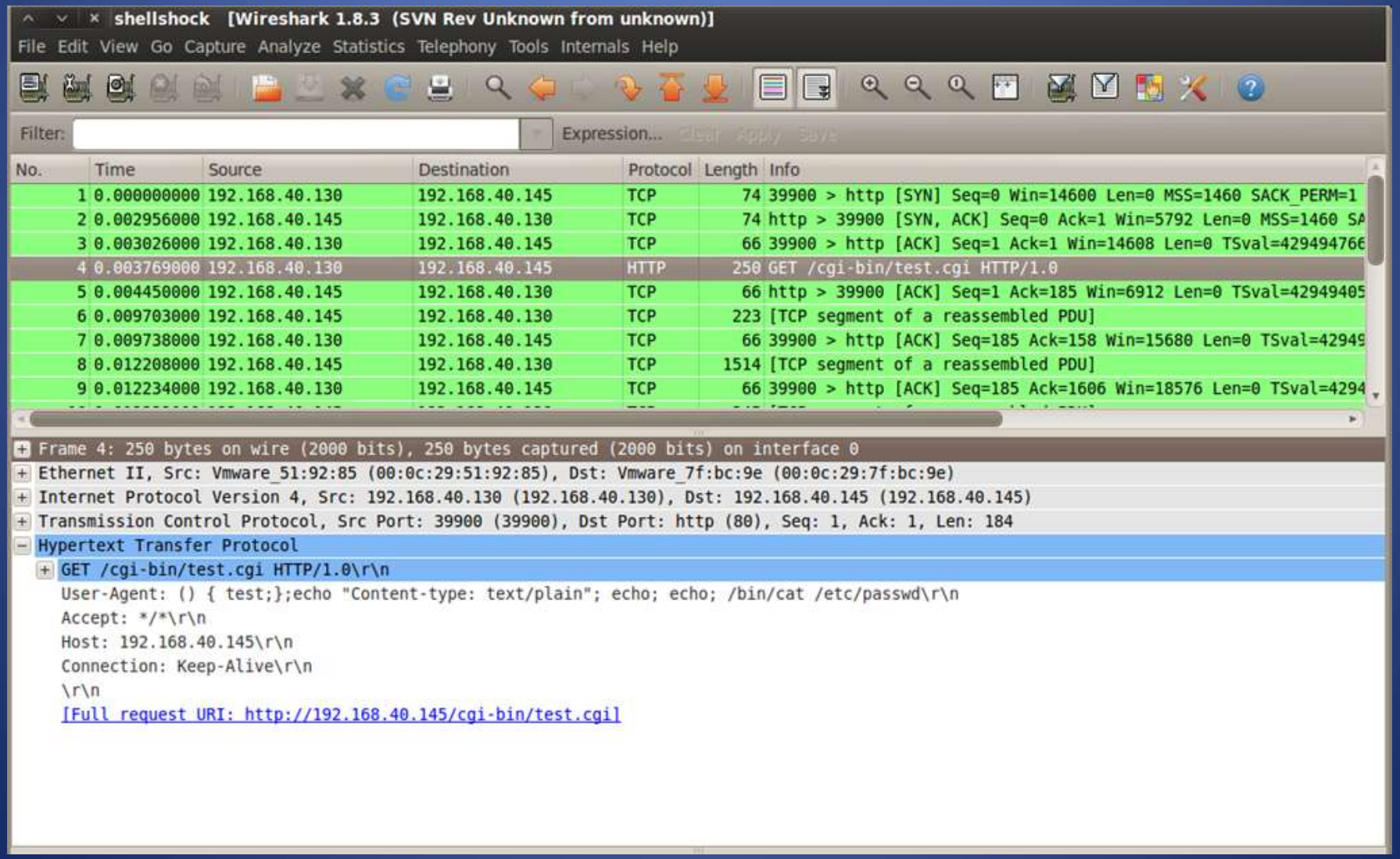
https://www.cvedetails.com/cve/CVE-2014-6271/
CVSS = 10

https://nvd.nist.gov/vuln-metrics/cvss/v2-calculator
https://nvd.nist.gov/vuln-metrics/cvss/v3-calculator

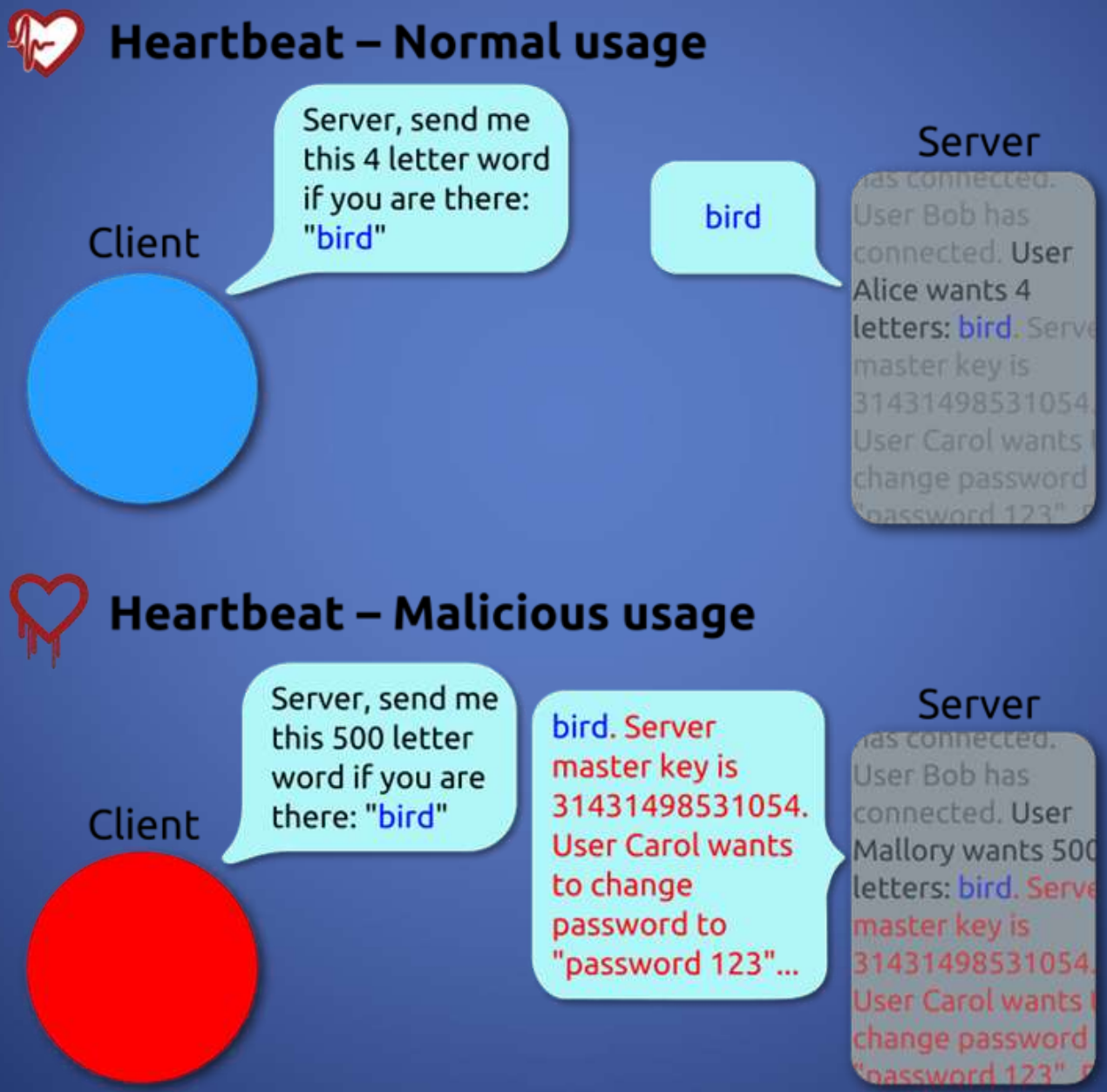
Metasploit module
https://www.rapid7.com/db/modules/auxiliary/scanner/http/apache_mod_cgi_bash_env

Shellshock explained

wget -U "() { test;};echo \"Content-type: text/plain\"; echo; echo; /bin/cat /etc/passwd" http://adresse_de_la_cible/cgi-bin/test.cgi



2014 - Heartbleed explained



Qualys. SSL Labs

Home Projects Qualys.com Contact

You are here: Home > Projects > SSL Server Test > www.gemalto.com

SSL Report: www.gemalto.com (91.241.42.157)

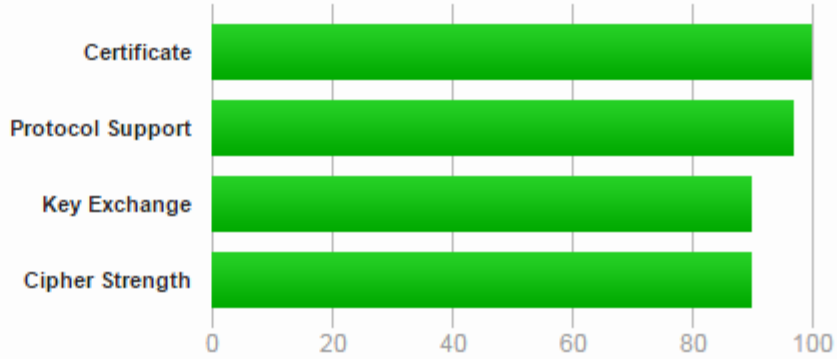
Assessed on: Sat, 13 Jan 2018 10:23:47 UTC | Hide | Clear cache

Scan Another »

Summary

Overall Rating

A



Visit our documentation page for more information, configuration guides, and books. Known issues are documented here.

DNS Certification Authority Authorization (CAA) Policy found for this domain. MORE INFO »

https://www.ssllabs.com/ssltest/analyze.html?d=www.gemalto.com

https://www.ssllabs.com/ssl-pulse/

Strict Transport Security

20,764 Sites that support **HTTP Strict Transport Security**

15.3 % of sites surveyed

+ 350 since previous month

CAA

3,797 Sites that support **Certification Authority Authorization** (RFC 6844)

2.8 % of sites surveyed

- 59 since previous month

Sites that require RC4

4 Sites that support only **RC4 cipher suites**

0.0 % of sites surveyed

- 1 since previous month

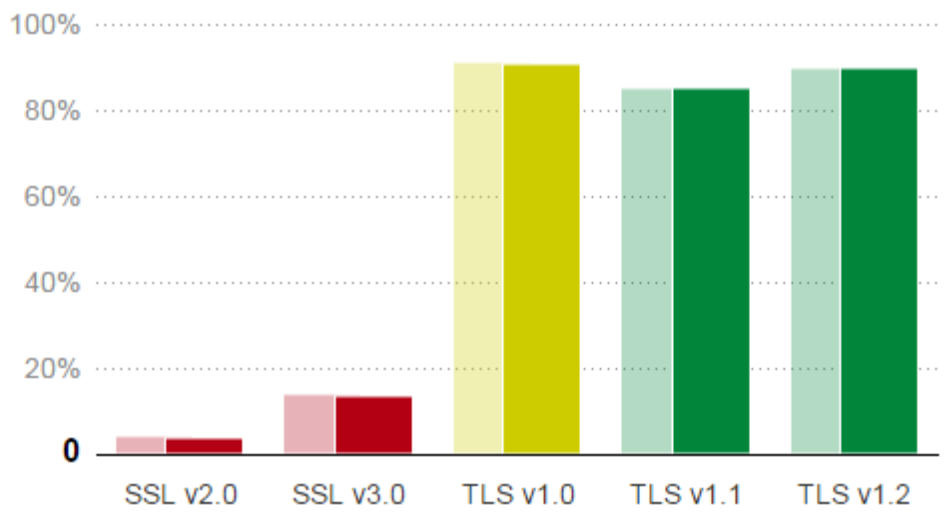
Heartbleed

86 Sites vulnerable to the **Heartbleed Bug**

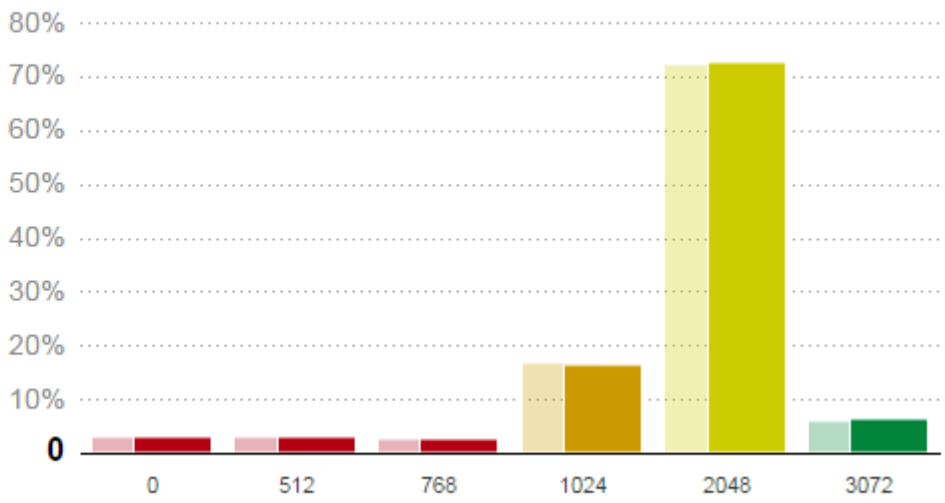
0.1 % of sites surveyed

- 9 since previous month

Protocol Support

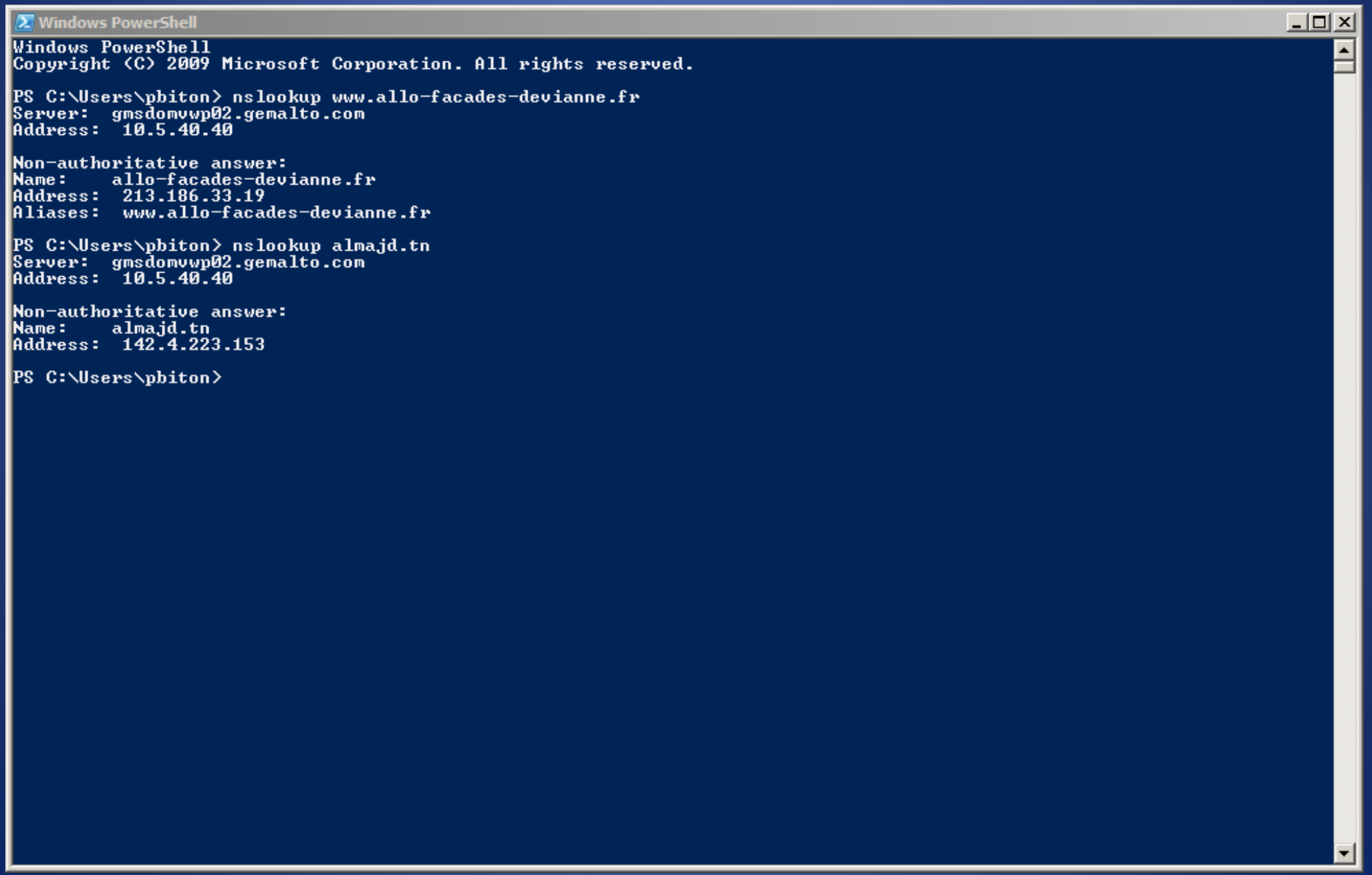


Key Exchange Strength

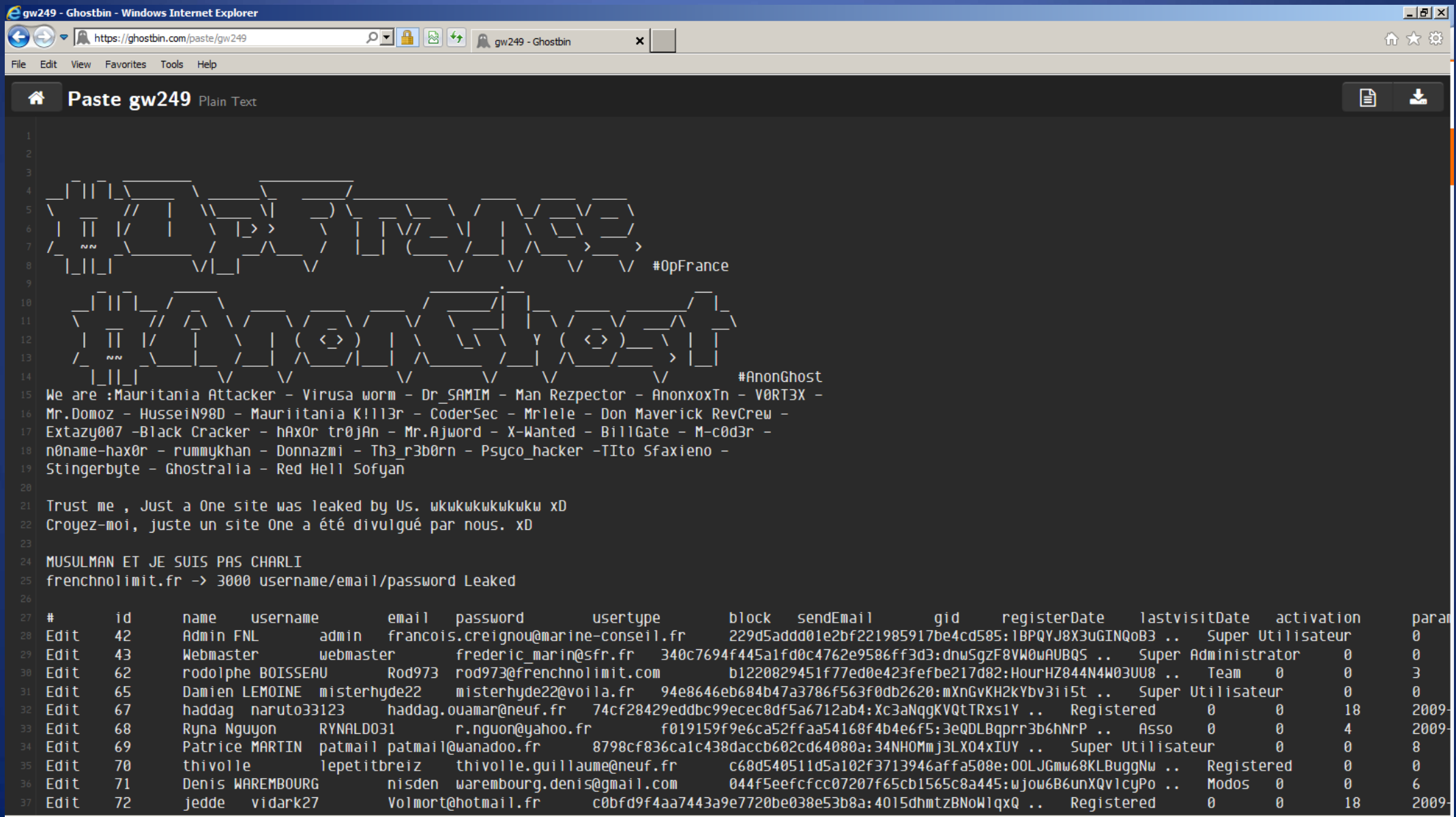


2015 - #OpFrance

#OpFrance


Windows PowerShell
Windows PowerShell
Copyright (C) 2009 Microsoft Corporation. All rights reserved.
PS C:\Users\pbiton> nslookup www.allo-facades-devianne.fr
Server: gmsdomvwp02.gemalto.com
Address: 10.5.40.40
Non-authoritative answer:
Name: allo-facades-devianne.fr
Address: 213.186.33.19
Aliases: www.allo-facades-devianne.fr
PS C:\Users\pbiton> nslookup almajd.tn
Server: gmsdomvwp02.gemalto.com
Address: 10.5.40.40
Non-authoritative answer:
Name: almajd.tn
Address: 142.4.223.153
PS C:\Users\pbiton>

#OpFrance


gw249 - Ghostbin - Windows Internet Explorer
https://ghostbin.com/paste/gw249
gw249 - Ghostbin
File Edit View Favorites Tools Help
Paste gw249 Plain Text
#OpFrance
#AnonGhost
We are :Mauritania Attacker - Virusa worm - Dr_SAMIM - Man Rezpector - AnonxoxTn - V0RT3X -
Mr.Domoz - HusseiN98D - Mauriitania K!ll3r - CoderSec - Mrlele - Don Maverick RevCrew -
Extazy007 -Black Cracker - hAxOr tr0jAn - Mr.Ajword - X-Wanted - BillGate - M-c0d3r -
n0name-hax0r - rummykhan - Donnazmi - Th3_r3b0rn - Psyco_hacker -TIto Sfaxieno -
Stingerbyte - Ghostralia - Red Hell Sofyan
Trust me , Just a One site was leaked by Us. wkwkwkwkwkwkw xD
Croyez-moi, juste un site One a été divulgué par nous. xD
MUSULMAN ET JE SUIS PAS CHARLI
frenchnolimit.fr -> 3000 username/email/password Leaked
id name username email password usertype block sendEmail gid registerDate lastvisitDate activation param
Edit 42 Admin FNL admin francois.creignou@marine-conseil.fr 229d5addd01e2bf221985917be4cd585:lBPQYJ8X3uGINQoB3 .. Super Utilisateur 0
Edit 43 Webmaster webmaster frederic_marin@sfr.fr 340c7694f445a1fd0c4762e9586ff3d3:dnwSgzF8VW0wAUBQS .. Super Administrator 0 0
Edit 62 rodolphe BOISSEAU Rod973 rod973@frenchnolimit.com b122082945lf77ed0e423fefbe217d82:HourHZ844N4W03UU8 .. Team 0 0 3
Edit 65 Damien LEMOINE misterhyde22 misterhyde22@voila.fr 94e8646eb684b47a3786f563f0db2620:mXnGvKH2kYbv3ii5t .. Super Utilisateur 0 0
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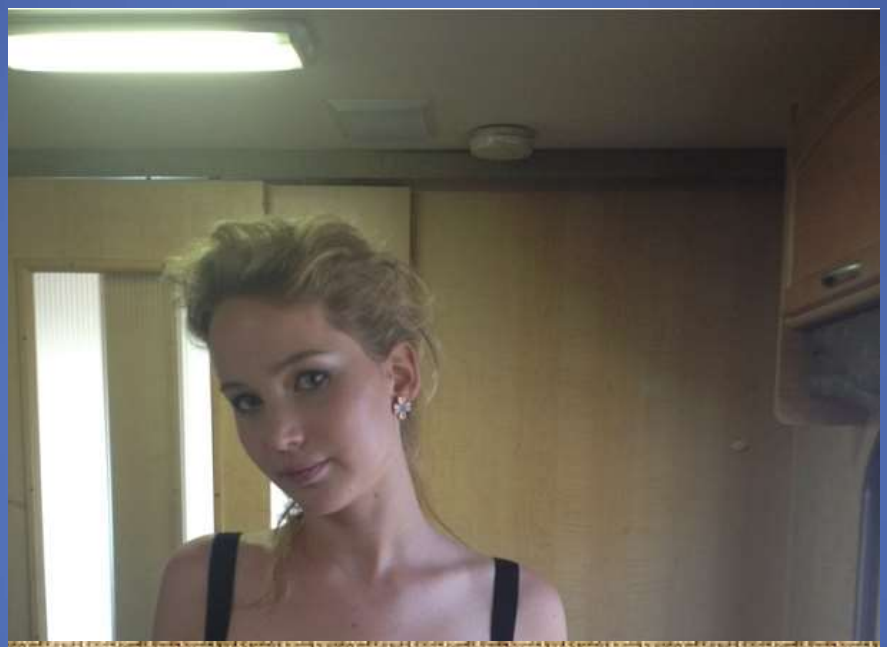
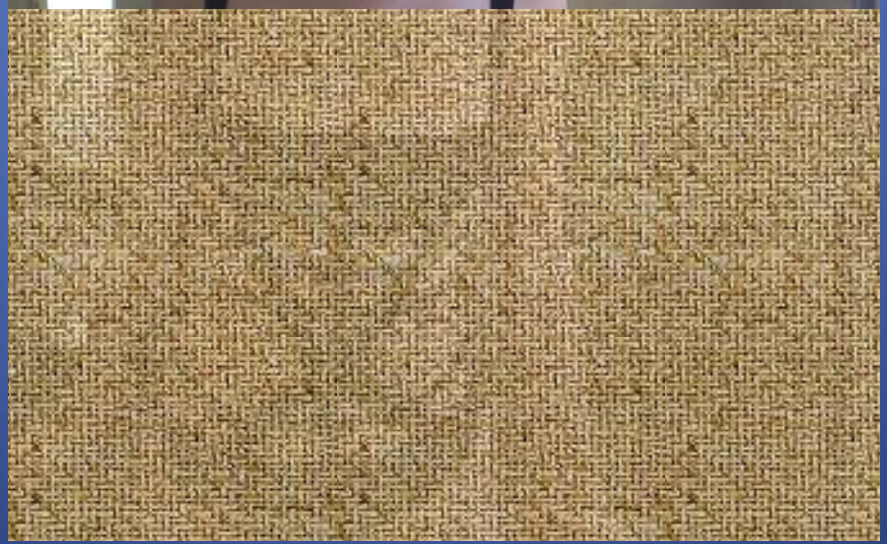
Edit 68 Ryna Nguyon RYNALDO31 r.nguon@yahoo.fr f019159f9e6ca52ffaa54168f4b4e6f5:3eQDLBqprr3b6hNrP .. Asso 0 0 4 2009-
Edit 69 Patrice MARTIN patmail patmail@wanadoo.fr 8798cf836ca1c438daccb602cd64080a:34NHOMmj3LXO4xIUY .. Super Utilisateur 0 0 8
Edit 70 thivolle lepetitbreiz thivolle.guillaume@neuf.fr c68d540511d5a102f3713946affa508e:OOLJGmw68KLBuggNw .. Registered 0 0
Edit 71 Denis WAREMBOURG nisden warembourg.denis@gmail.com 044f5eefcfcc07207f65cb1565c8a445:wjow6B6unXQvlcyPo .. Modos 0 0 6
Edit 72 jedde vidark27 Volmort@hotmail.fr c0bfd9f4aa7443a9e7720be038e53b8a:4Ol5dhmtzBNoWlqxQ .. Registered 0 0 18 2009-

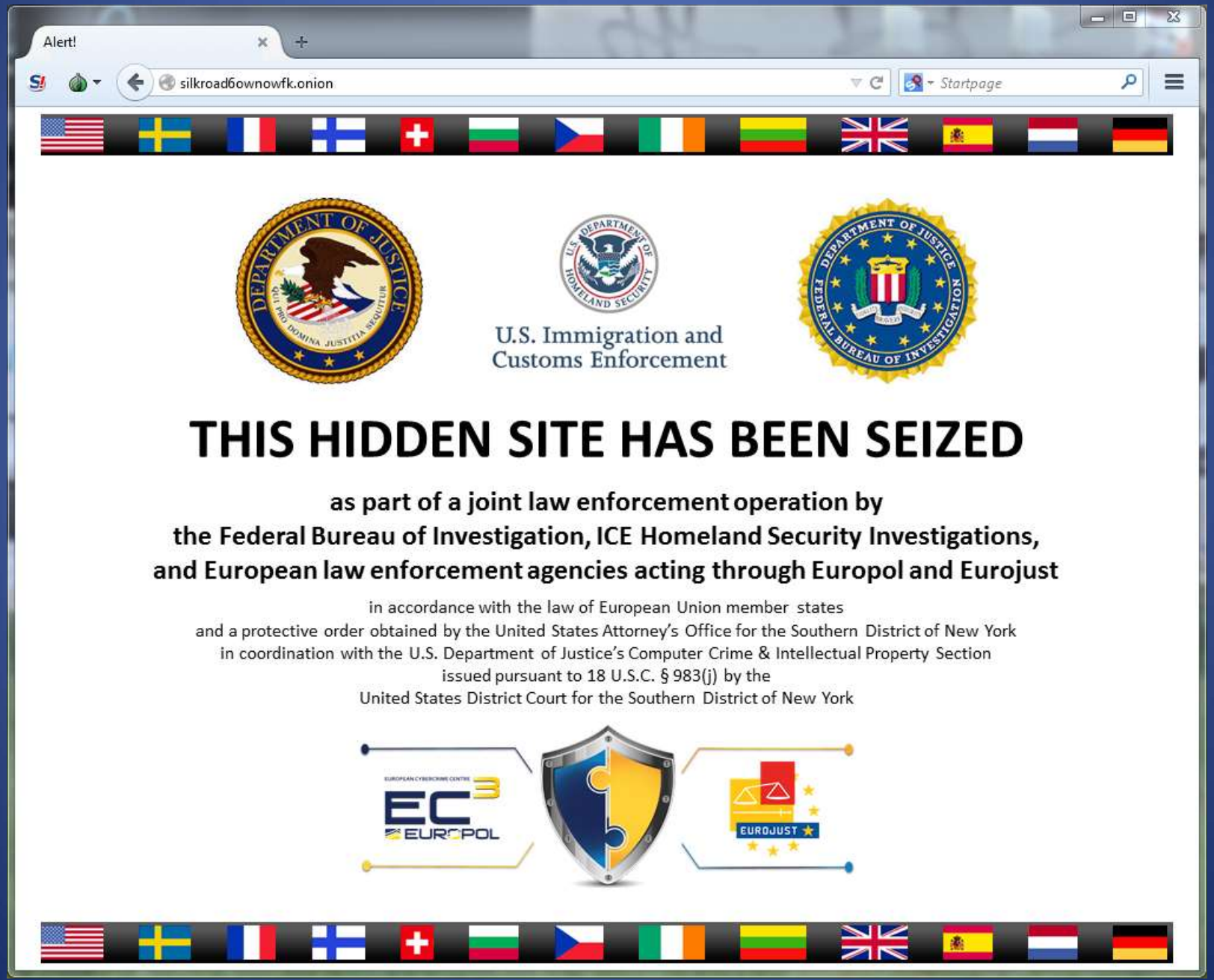
2014 - Apple attack

- Jennifer Lawrence





2017 - 2013 - On the dark side…



Price of your assets

SOCIAL ENGINEERING SPECIALIST

Because there is no patch for human stupidity

EC-Council CEH EC-COUNCIL

- Attack phases

What does a hacker do?

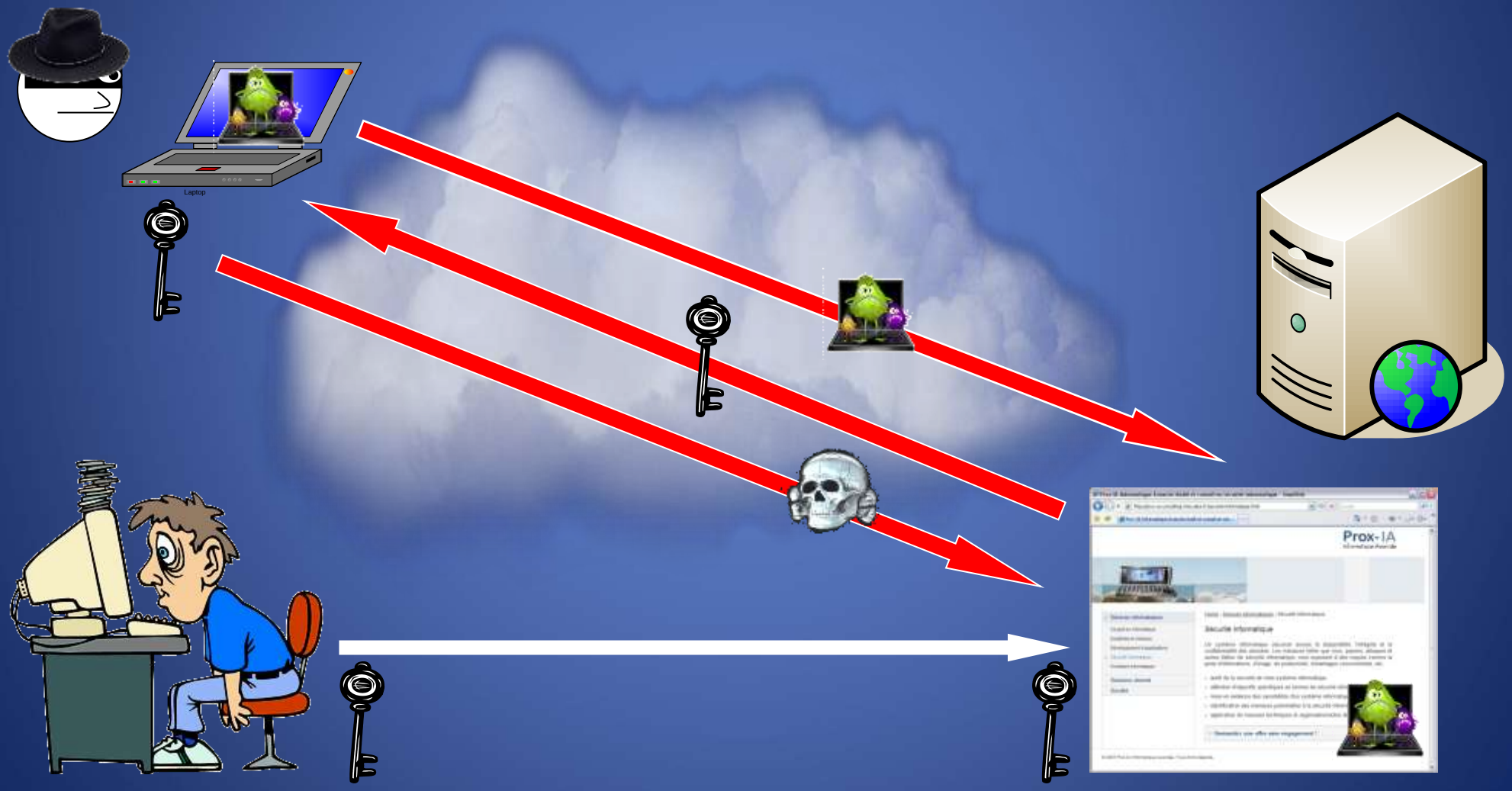
- **Phase I:** Reconnaissance / Intelligence gathering
  - Passive: Google / Social Networks / Maltego / whois
  - Active: SE
- **Phase II:** Scanning (active)
  - Pre-exploitation phase (pre-attack):
    - Vulnerability analysis: nmap, Nessus
  - OS Fingerprinting, port scanning,…
- **Phase III:** Gaining access
  - Exploitation: Metasploit
    - DOS, session hijacking, password cracking
    - Privilege escalation
  - Post-exploitation
- **Phase IV:** Maintaining access
  - RAT installation
  - Exfiltration tools
- **Phase V:** Covering tracks
- **Phase VI:** Reporting

Cas 1 : Scénarii d’intrusions

Vol de cookie de session:

- Le forum du site web cible contient une vulnérabilité **XSS**
- Utilisation de XSS pour **voler le cookie de session** de la victime
- **Accès à l’application web** avec le cookie de session de la victime
- Le site web permet de récupérer les informations personnelles de la victime (photos)

Cas 1 : Scénarii d’intrusions

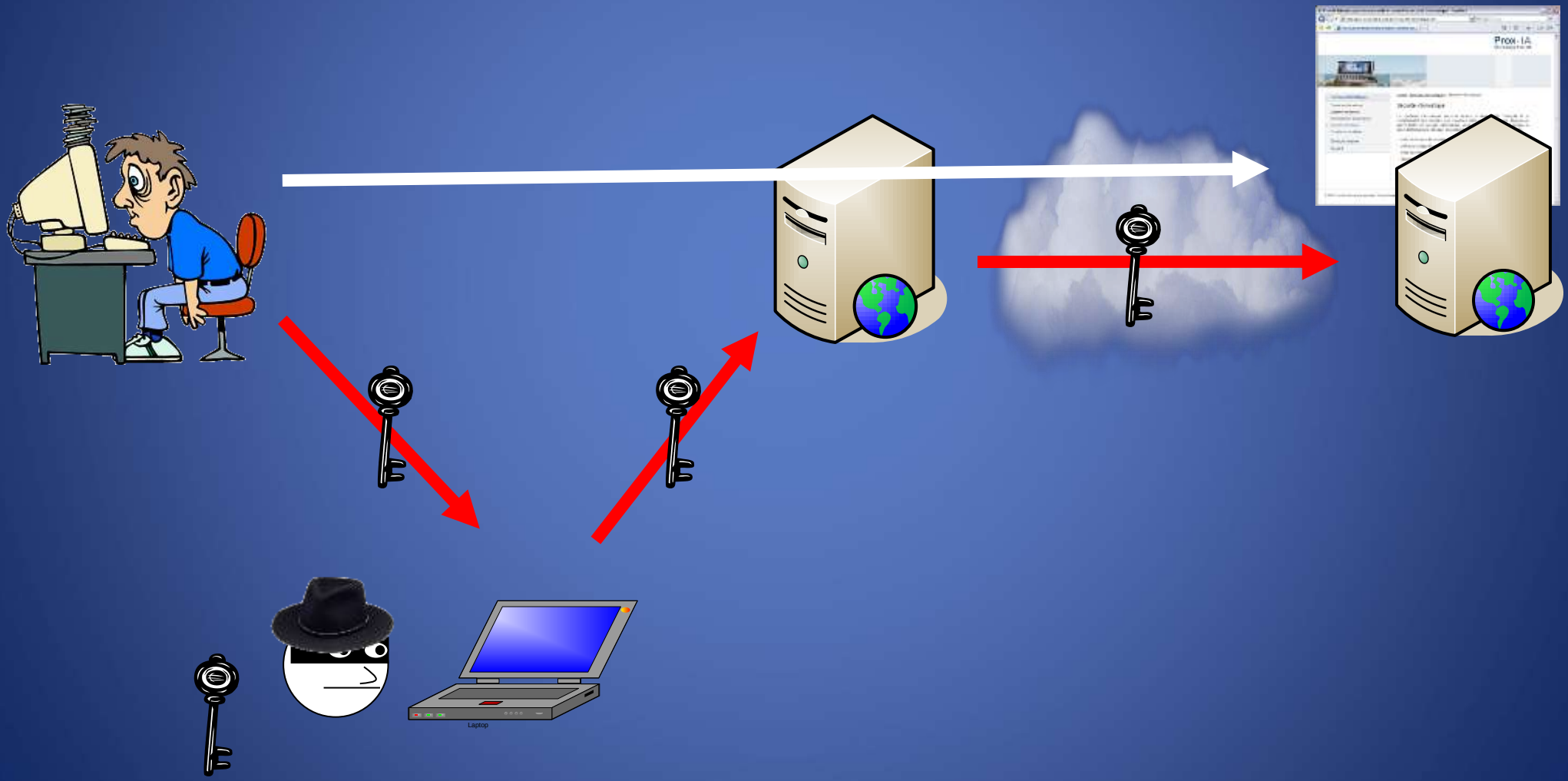


Cas 2 : Scénarii d'intrusions

Man In The Middle en entreprise:

- L'attaquant connecte sa machine **Kali** sur le réseau
- L'attaquant connaît:
  - L'adresse IP de la machine de la victime
  - L'adresse IP de la Gateway
- L'attaquant utilise Ettercap pour se positionner entre la machine de la victime et la Gateway en effectuant un **ARP poisoning**
- L'attaquant peut donc voir le trafic **HTTP** qui transite entre la victime et internet et accéder aux noms d'utilisateur et aux mots de passe des sites visités
- Si la victime n'est pas prudente et ne tient pas compte des avertissements concernant les certificats (dans le cadre de l'utilisation d'un site web en **HTTPS**), l'attaquant peut également accéder au nom d'utilisateur et au mot de passe d'un site bancaire par exemple

Cas 2 : Scénarii d’intrusions



Anatomie d’une attaque (1/2)

Identification du site web cible

- **Recherche** d’informations sur internet
- **Cartographie** des technologies applicatives
  - scan des ports ouverts HTTP, HTTPS, LDAP, SQL,…
  - récupération des pages par défaut
  - récupération de bannières
  - analyse des extensions et la structure par défaut des répertoires
  - générer et examiner les erreurs provoquées

Anatomie d'une attaque (2/2)

- Evaluation des **vulnérabilités**
  - Injections
  - Champs de saisie
  - Activation de pages d'exemples
  - Activation d'applications installées par défaut
  - Mécanisme d'authentification
  - Gestion de session
- Définition des scénarii d'**attaque**
- Lancer de l'attaque
  - **Exécution** des scénarii

What Does a Hacker Do?

Phase 1 - Reconnaissance

Reconnaissance refers to the preparatory phase where an attacker seeks to gather information about a target prior to launching an attack

1

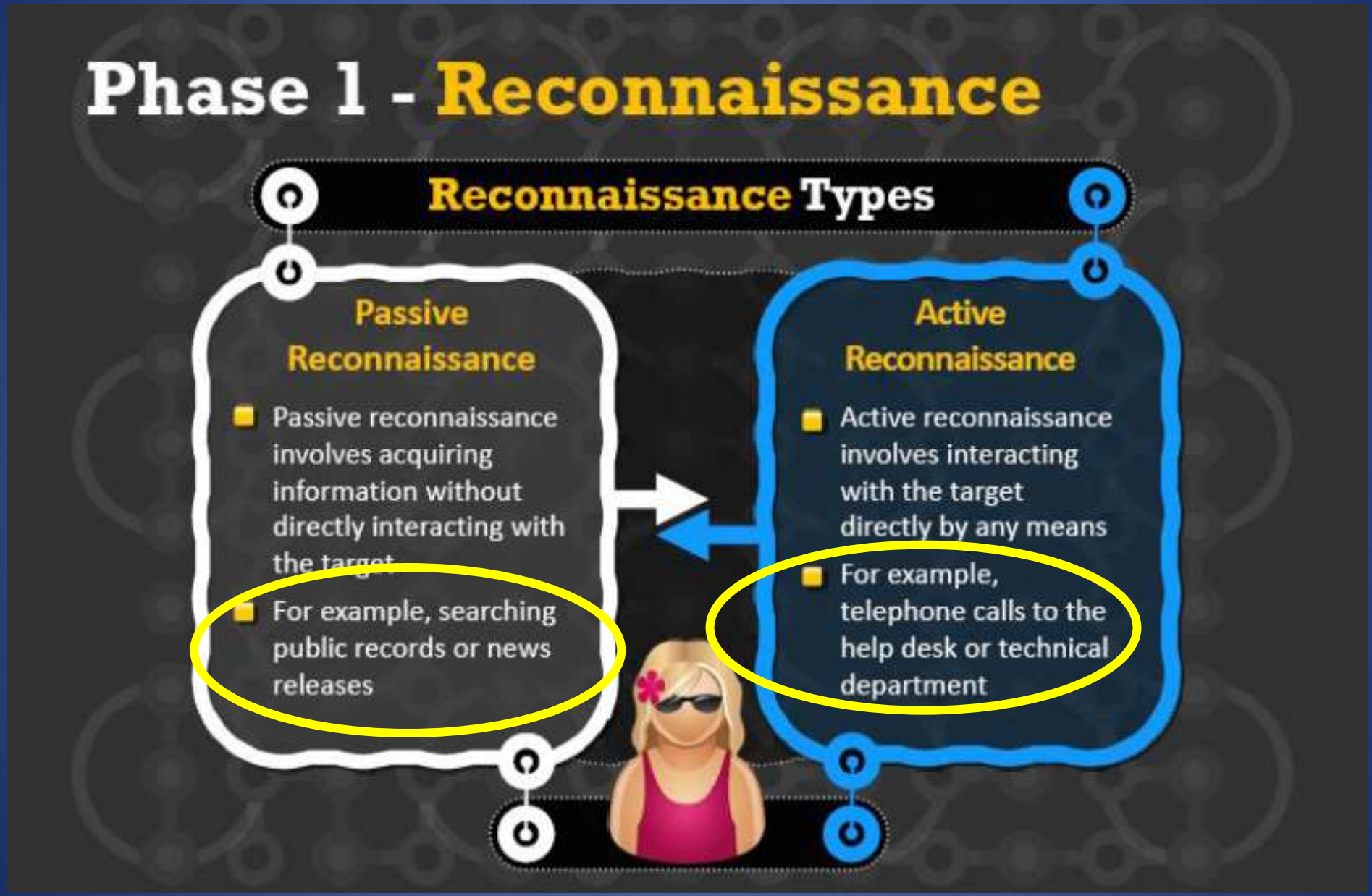
Could be the future point of return, noted for ease of entry for an attack when more about the target is known on a broad scale

2

Reconnaissance target range may include the target organization's clients, employees, operations, network, and systems

3

Phase 1 - Reconnaissance



Phase 2 - Scanning

Pre-Attack Phase

Scanning refers to the pre-attack phase when the attacker scans the network for specific information on the basis of information gathered during reconnaissance

Port Scanner

Scanning can include use of dialers, port scanners, network mapping, sweeping, vulnerability scanners, etc.

Extract Information

Attackers extract information such as computer names, IP address, and user accounts to launch attack

Phase 3 – Gaining Access

Gaining access refers to the point where the attacker obtains access to the operating system or applications on the computer or network

The attacker can escalate privileges to obtain complete control of the system. In the process, intermediate systems that are connected to it are also compromised

The attacker can gain access at the operating system level, application level, or network level

Examples include password cracking, buffer overflows, denial of service, session hijacking, etc.

Phase 4 – Maintaining Access

Maintaining access refers to the phase when the attacker tries to retain his or her ownership of the system

Attackers may prevent the system from being owned by other attackers by securing their exclusive access with Backdoors, RootKits, or Trojans

Attackers use the compromised system to launch further attacks

Attackers can upload, download, or manipulate data, applications, and configurations on the owned system

Phase 5 – Covering Tracks

Covering tracks refers to the activities carried out by an attacker to hide malicious acts

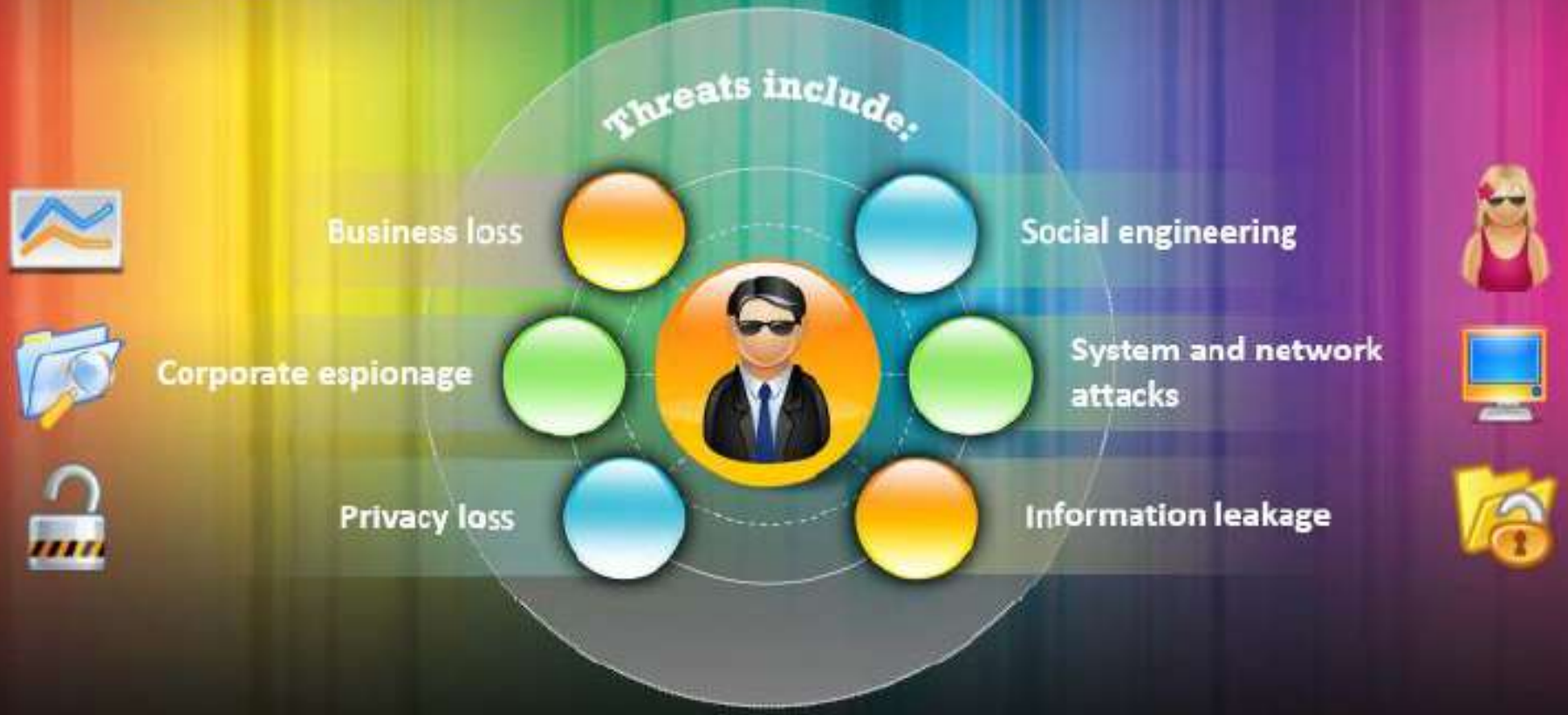
The attacker's intentions include: Continuing access to the victim's system, remaining unnoticed and uncaught, deleting evidence that might lead to his prosecution

The attacker overwrites the server, system, and application logs to avoid suspicion

- Tools for reco

Footprinting Threats

- Attackers gathers valuable system-level information such as account details, operating system and other software versions, server names, and database schema details from footprinting techniques



Footprinting Through Search Engines

- Attackers use search engines to **extract information about a target** such as technology platforms, employee details, login pages, intranet portals, etc. which helps in performing social engineering and other types of advanced system attacks
- Search engine **cache may provide sensitive information** that has been removed from the World Wide Web (WWW)

http://www.adbs.fr/outils-de-recherche-web-828.htm

Collect Location Information

- Use GoogleEarth tool to get the location of the place

http://earth.google.com

People Search

The people search returns the following information about a person:

- Residential addresses
- Contact numbers
- Date of birth
- E-mail addresses
- Satellite pictures of the private residences

http://www.peekyou.com/france/

Gather Information from Financial Services

Google Finance

Yahoo Finance

EC-Council CEH EC-COUNCIL

Footprinting Through Job Sites

You can gather a **company's infrastructure details** from job postings

Look for these information:

- Job requirements
- Employee's profile
- Hardware information
- Software information

Job ID
17123.6554870.6
423191730004

Location
Boca Raton, FL 33487

Job Status
IT/Software Development

Apply Now

Become a Fan on facebook

Network Administrator, Active Directory, Citrix, Exchange

Job Description:

- Design and implement technical solutions on the Windows platform to support business requirements
- Support existing Windows infrastructure including: Active Directory 2003, SMS, SUS, Citrix Metaframe, SQL Server, SQL Clusters, Exchange 5.5, Exchange 2003, VM Ware, Veritas backup software, Account and server security, Disaster Recovery services, RAID technologies, and Fibre/SAN disk solutions.

Job Experience:

- 5 or more years experience working in IT implementing and supporting a global business
- Prior experience in supporting a global Windows server and Domain Infrastructure
- Experience implementing and supporting Active Directory, Citrix Metaframe, SQL Server, SQL Cluster, DNS, DHCP, WINS, and Exchange 2003 in an Enterprise environment
- Very strong systems troubleshooting skills
- Experience in providing 24-hour support to a global enterprise as part of an on-call rotation
- Effective interpersonal skills with the ability to be persuasive
- Other skills: Building Effective Teams, Action Oriented Peer Relationships, Customer Focus, Priority Setting, Problem Solving, and Business Acumen
- Bachelorâ€™s Degree or equivalent experience
- MCSE (2003) certification a plus, Citrix Certification a plus

Competitive Intelligence Gathering

1. Compare your products with your competitors' offerings

2. Analyze your market positioning compared to the competitors

3. Pull up a list of competing companies in the market

4. Extract salespersons' war stories on how deals are won and lost in the competitive arena

5. Produce a profile of the CEO and the entire management staff of the competitor

WHOIS Lookup

WHOIS databases are maintained by Regional Internet Registries and contain the **personal information of domain owners**

WHOIS Lookup Tools

http://www.tamos.com
http://netcraft.com
http://www.whois.net
http://www.iptools.com

WHOIS Query Returns

1. Domain name details
2. Contact details of domain owner
3. Domain name servers
4. NetRange

Attackers Look for

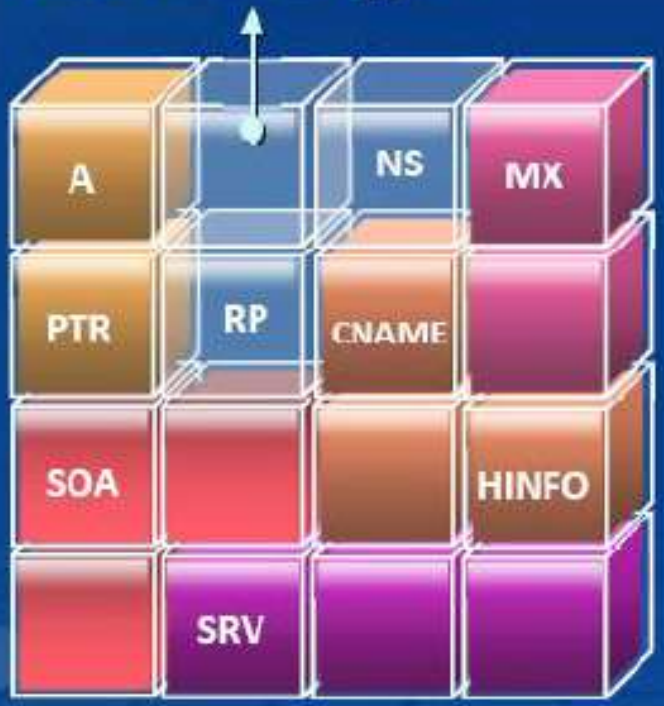
1. Physical location
2. Telephone number
3. Email address
4. Technical and administrative contacts

Regional Internet Registry

1. AfrINIC
2. ARIN
3. APNIC
4. LACNIC, RIPE NCC

Extracting DNS Information

DNS Record Type



DNS Records provide important information about location and type of servers

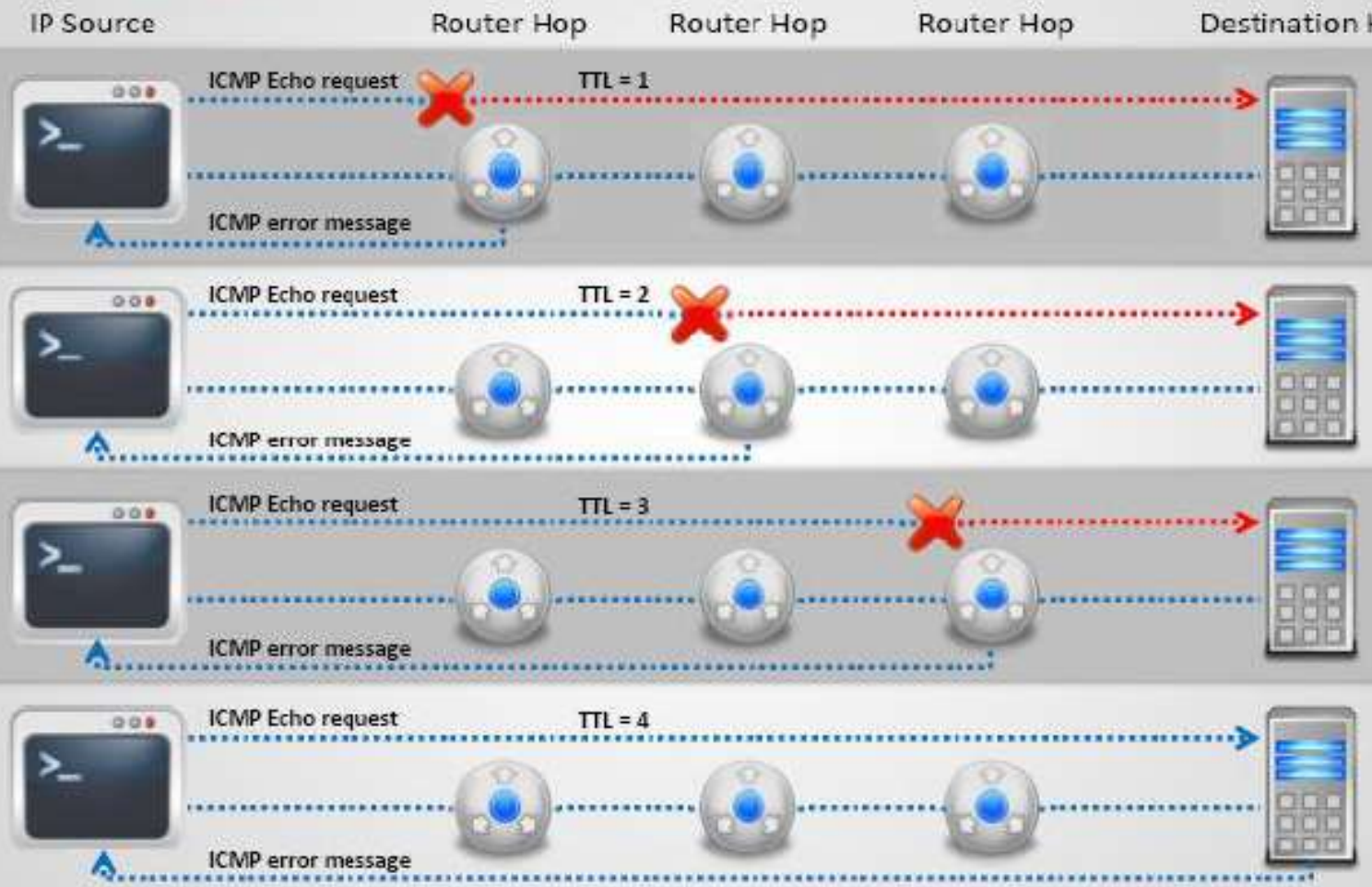
- **A** - Points to a host's IP address
- **MX** - Points to domain's mail server
- **NS** - Points to host's name server
- **CNAME** - Canonical naming allows aliases to a host
- **SOA** - Indicate authority for domain
- **SRV** - Service records
- **PTR** - Maps IP address to a hostname
- **RP** - Responsible person
- **HINFO** - Host information record includes CPU type and OS

DNS Interrogation Tools

- http://www.dnsstuff.com
- http://network-tools.com
- http://www.checkdns.net
- http://www.iptools.com

http://www.dnsstuff.com/

Traceroute



Traceroute programs work on the concept of ICMP protocol and use the TTL field in the header of ICMP packets to discover the routers on the path to a target host

tracert prox-ia.com

Traceroute Analysis

I Attackers conduct traceroute to extract information about: network topology, trusted routers, and firewall locations

II For example: after running several traceroutes, an attacker might obtain the following information:

- traceroute 1.10.10.20, second to last hop is 1.10.10.1
- traceroute 1.10.20.10, third to last hop is 1.10.10.1z
- traceroute 1.10.20.10, second to last hop is 1.10.10.50
- traceroute 1.10.20.15, third to last hop is 1.10.10.1
- traceroute 1.10.20.15, second to last hop is 1.10.10.50

III By putting this information together, attackers can draw the network diagram

Demo XXI

Dnsstuff
http://www.dnsstuff.com

- DNS report: prox-ia.com
- Whois lookup: prox-ia.com
- IP Information: 88.190.253.248
- Traceroute: prox-ia.com

tracert prox-ia.com

Demo XXI bis

Social networks: Bertrand Bernouilli

Mirroring Entire Website

Web mirroring tools allows you to download a website to a local directory, building recursively all directories, HTML, images, flash, videos and other files from the server to your computer

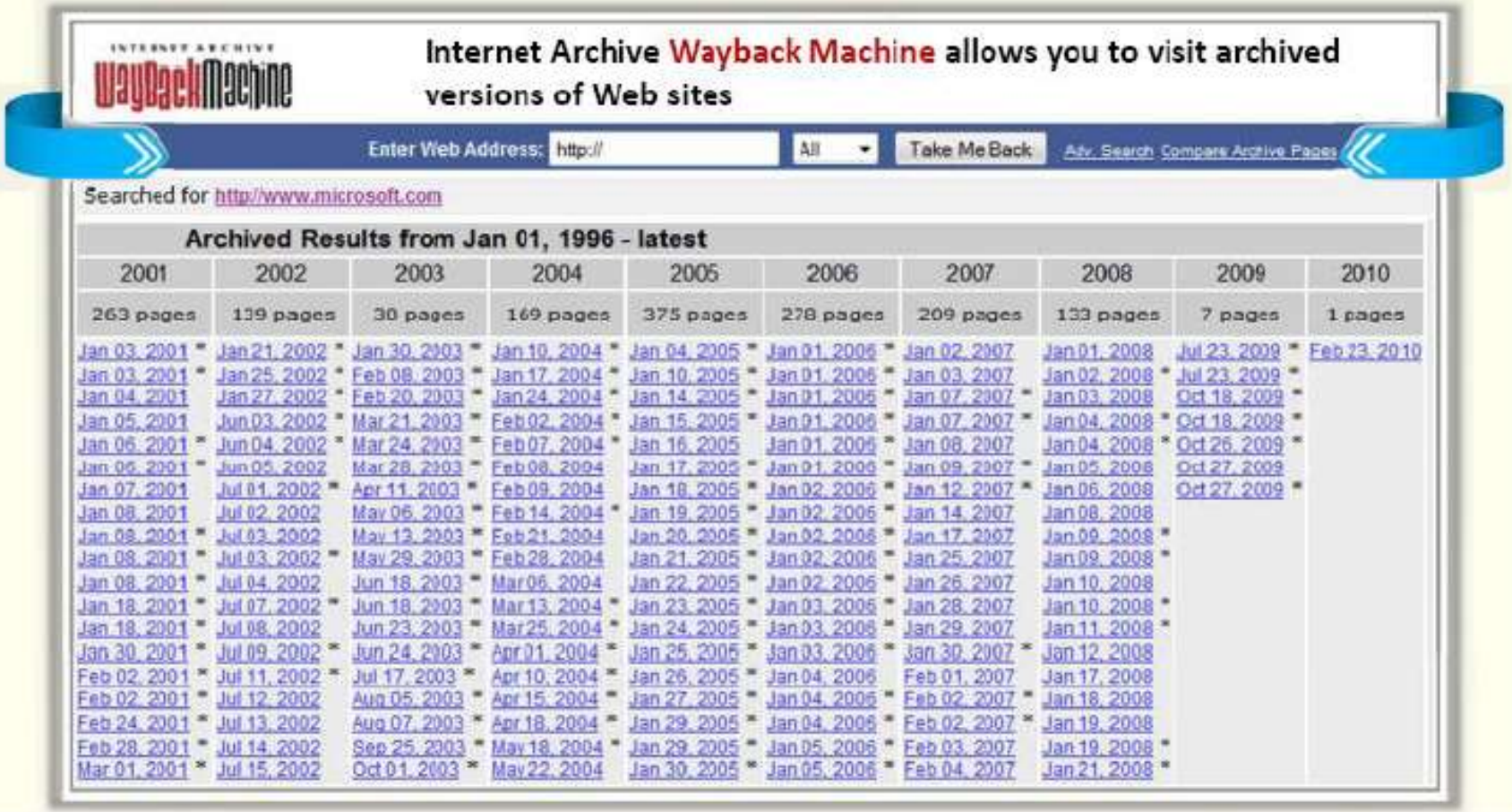
EC-COUNCIL

Demo XXII

La Banque Postale

Extract Website Information from

http://www.archive.org



Search www.prox-ia.com in https://archive.org

Tracking Email Communications

E-mail tracking is a method to monitor and spy the delivered e-mails to the intended recipient

01	When the email was received and read
02	Send destructive emails
03	GPS location and map of the recipient
04	Time spent on reading the emails
05	Whether or not the recipient visited any links sent to them
06	Track PDF and other types of attachments
07	Set messages to expire after a specified time

Footprint Using Google Hacking Techniques

Query String

Google hacking is a term that refers to the art of creating complex **search engine queries**

Vulnerable Sites

It detects websites that are **vulnerable** to numerous exploits and vulnerabilities

Google Operators

It uses Google operators to **locate specific strings of text** within the search results

What a Hacker Can Do With Google Hacking?

Google Advance Search Operators

Google supports several advanced operators that help in modifying the search

[cache:]	Shows the version of the web page that Google has in its cache
[link:]	Lists web pages that have links to the specified web page
[related:]	Lists web pages that are "similar" to a specified web page.
[info:]	Will present some information that Google has about that web page
[site:]	If you include [site:] in your query, Google restricts the results to those websites in the given domain
[allintitle:]	If you start a query with [allintitle:], Google restricts the results to those with all of the query words in the title
[intitle:]	If you include [intitle:] in your query, Google restricts the results to documents containing that word in the title
[allinurl:]	If you start a query with [allinurl:], Google restricts the results to those with all of the query words in the url
[inurl:]	If you include [inurl:] in your query, Google restricts the results to documents containing that word in the url

Finding Resources using Google Advance Operator

[intitle:intranet inurl:intranet +intext:"human resources"]:

It allows you not only to access a company's private network, but also provides the **employee listings** and other **sensitive information** that can be incredibly useful for any social engineering endeavor

inurl:intranet intitle:intranet + intext:«ressources humaines»

Demo XXIII

GHDB

http://www.exploit-db.com/

Cycle de vie des vulnérabilités (black hat)

1. Découverte d'une faille: un hacker découvre une faille de sécurité
2. Publication de l'exploit: le risque augmente très fortement avec la publication; les "scripts kiddies" entrent en action
3. Correctif de l'éditeur: l'éditeur publie un correctif; la faille est désormais connue de tous
4. Application du correctif: l'entreprise réagit et met à jour l'application vulnérable

"0" day

Source: eEye Digital Security - http://research.eeye.com/html/alerts/zeroday/index.html

Cycle de vie des vulnérabilités (white hat)

1. Découverte d'une faille: une société spécialisée ou l'éditeur découvre une faille de sécurité
2. Publication d'un correctif: les hackers analysent le correctif par reverse engineering
3. Publication d'un exploit: les « scripts kiddies » entrent en action
4. Application du correctif: l'entreprise doit réagir rapidement et mettre à jour l'application vulnérable

Phases in a Social Engineering Attack

Research	Develop	Exploit
Research on target company Dumpster diving, websites, employees, tour company, etc.		**Select victim** Identify the frustrated employees of the target company
Develop relationship Develop relationship with the selected employees		**Exploit the relationship** Collect sensitive account information, financial information, and current technologies

Command Injection Attacks

Online

Internet connectivity enables attackers to **approach employees** from an anonymous Internet source and **persuade** them to provide information through a believable user

Telephone

Request information, usually through the **imitation of a legitimate user**, either to access the telephone system itself or to gain remote access to computer systems

Personal Approaches

In Personal Approaches, attackers get information by **directly asking for it**

Human-Based Social Engineering

Posing as a legitimate end user

Give identity and ask for the sensitive information

"Hi! This is John, from Department X. I have forgotten my password. Can I get it?"

Posing as an important user

Posing as a VIP of a target company, valuable customer, etc.

"Hi! This is Kevin, CFO Secretary. I'm working on an urgent project and lost my system password. Can you help me out?"

Posing as technical support

Call as technical support staff and request IDs and passwords to retrieve data

"Sir, this is Mathew, Technical support, X company. Last night we had a system crash here, and we are checking for the lost data. Can u give me your ID and password?"

Technical Support Example

"A man calls a company's help desk and says he has forgotten his password. He adds that if he misses the deadline on a big advertising project, his boss might fire him.

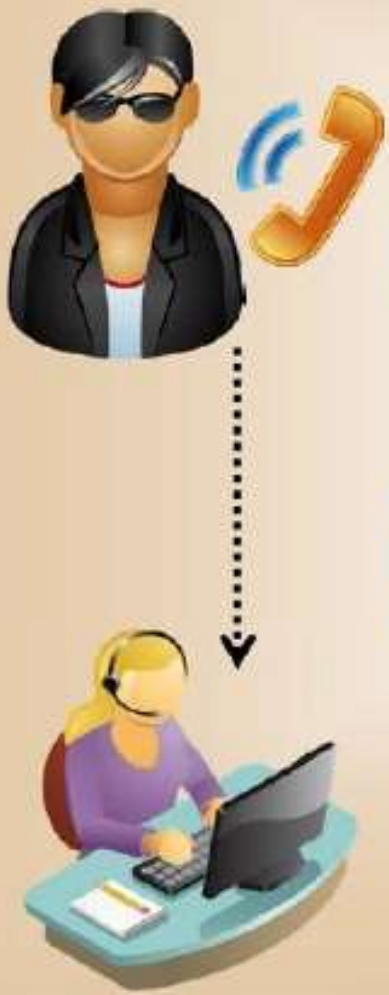
The help desk worker feels sorry for him and quickly resets the password, unwittingly giving the attacker clear entrance into the corporate network"

Authority Support Example

"Hi, I am John Brown. I'm with the external auditors Arthur Sanderson. We've been told by corporate to do a surprise inspection of your disaster recovery procedures.

Your department has 10 minutes to show me how you would recover from a website crash."

Authority Support Example



"Hi I'm Sharon, a sales rep out of the New York office. I know this is short notice, but I have a group of prospective clients out in the car that I've been trying for months to get to outsource their security training needs to us.

They're located just a few miles away and I think that if I can give them a quick tour of our facilities, it should be enough to push them over the edge and get them to sign up.

Oh yeah, they are particularly interested in what security precautions we've adopted. Seems someone hacked into their website a while back, which is one of the reasons they're considering our company."

Human-based Social Engineering

Eavesdropping

- Eavesdropping or **unauthorized listening of conversations** or reading of messages
- Interception of any form such as audio, video, or written
- It can also be done using communication channels such as telephone lines, email, instant messaging, etc.

Shoulder Surfing

- Shoulder surfing is the name given to the procedure that thieves use to **find out passwords, personal identification number, account numbers**, etc.
- Thieves look over your shoulder--or even watch from a distance using binoculars, in order to get those pieces of information

Human-based Social Engineering: Dumpster Diving

- Dumpster diving is looking for treasure in someone else's **trash**

Human-based Social Engineering

Tailgating

An unauthorized person, wearing a fake ID badge, enters a secured area by closely following an authorized person through a door requiring key access

In Person

Survey a target company to collect information on:

- **Current technologies**
- **Contact information**

Third-Party Authorization

Refer to an important person in the organization and try to collect data

"Mr. George, our Finance Manager, asked that I pick up the audit reports. Will you please provide them to me?"

Human-based Social Engineering

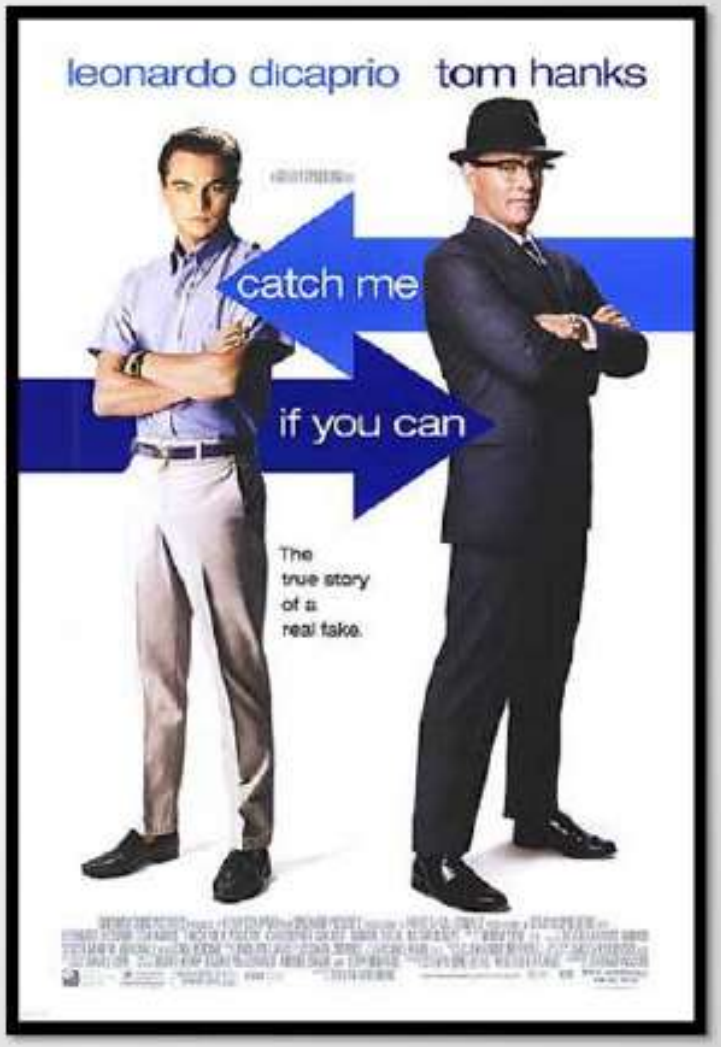
Reverse Social Engineering

- This is when the attacker **creates a persona** who appears to be in a position of authority so that employees will ask him for information, rather than the other way around
- Reverse social engineering attack involves **sabotage**, **marketing**, and **tech support**

Piggybacking

- "I forgot my ID badge at home. Please help me."
- An authorized person provides **access to an unauthorized person** by keeping the secured door open

Watch these Movies



Computer-Based Social Engineering

Hoax letters are emails that issue **warnings** to the user on new viruses, Trojans, or worms that may harm the user's system

Gathering **personal information** by chatting with a selected online user to get information such as birth dates and maiden names

Pop-up Windows → **Hoax Letters** → **Chain Letters** → **Instant Chat Messenger** → **Spam Email**

Windows that suddenly pop up while surfing the Internet and ask for **users' information** to login or sign-in

Chain letters are emails that offer **free gifts** such as money and software on the condition that the user has to **forward** the mail to the said number of persons

Irrelevant, **unwanted**, and **unsolicited email** to collect the financial information, social security numbers, and network information

Insider Attack

Spying

- If a competitor wants to cause damage to your organization, steal critical secrets, or put you out of business, they just have to find a job opening, prepare someone to pass the interview, have that person hired, and they will be in the organization

Revenge

- It takes only one disgruntled person to take revenge and your company is compromised

- 60% of attacks occur behind the firewall
- An inside attack is easy to launch
- Prevention is difficult
- The inside attacker can easily succeed

Disgruntled Employee

- Most cases of insider abuse can be traced to individuals who are introverted, incapable of dealing with stress or conflict, and **frustrated with their job**, office politics, and lack of respect or promotion etc.
- Disgruntled employees may **pass company secrets** and **intellectual property** to competitors for monitory benefits

Demo XXIV

Verizon DBIR 2016 (Data Breach Investigations report)
http://www.verizonenterprise.com/resources/reports/rp_DBIR_2016_Report_en_xg.pdf

- Breach trends
- Insider and privilege misused
- …

Common Intrusion Tactics and Strategies for Prevention

Area of Risk	Attacker's Tactics	Combat Strategy
Phone (help desk) 	Impersonation and persuasion	Train employees/help desk to never reveal passwords or other information by phone
Building entrance 	Unauthorized physical access	Tight badge security, employee training, and security officers
Office 	Shoulder surfing	Do not type in passwords with anyone else present (or if you must, do it quickly!)
Phone (help desk) 	Impersonation on help desk calls	Assign a PIN to all employees to help desk support
Office 	Wandering through halls looking for open offices	Escort all guests
Mail room 	Insertion of forged memos	Lock and monitor mail room
Machine room/ Phone closet 	Attempting to gain access, remove equipment, and/or attach a protocol analyzer to grab the confidential data	Keep phone closets, server rooms, etc. locked at all times and keep updated inventory on equipment
Phone and PBX 	Stealing phone toll access	Control overseas and long-distance calls, trace calls, and refuse transfers

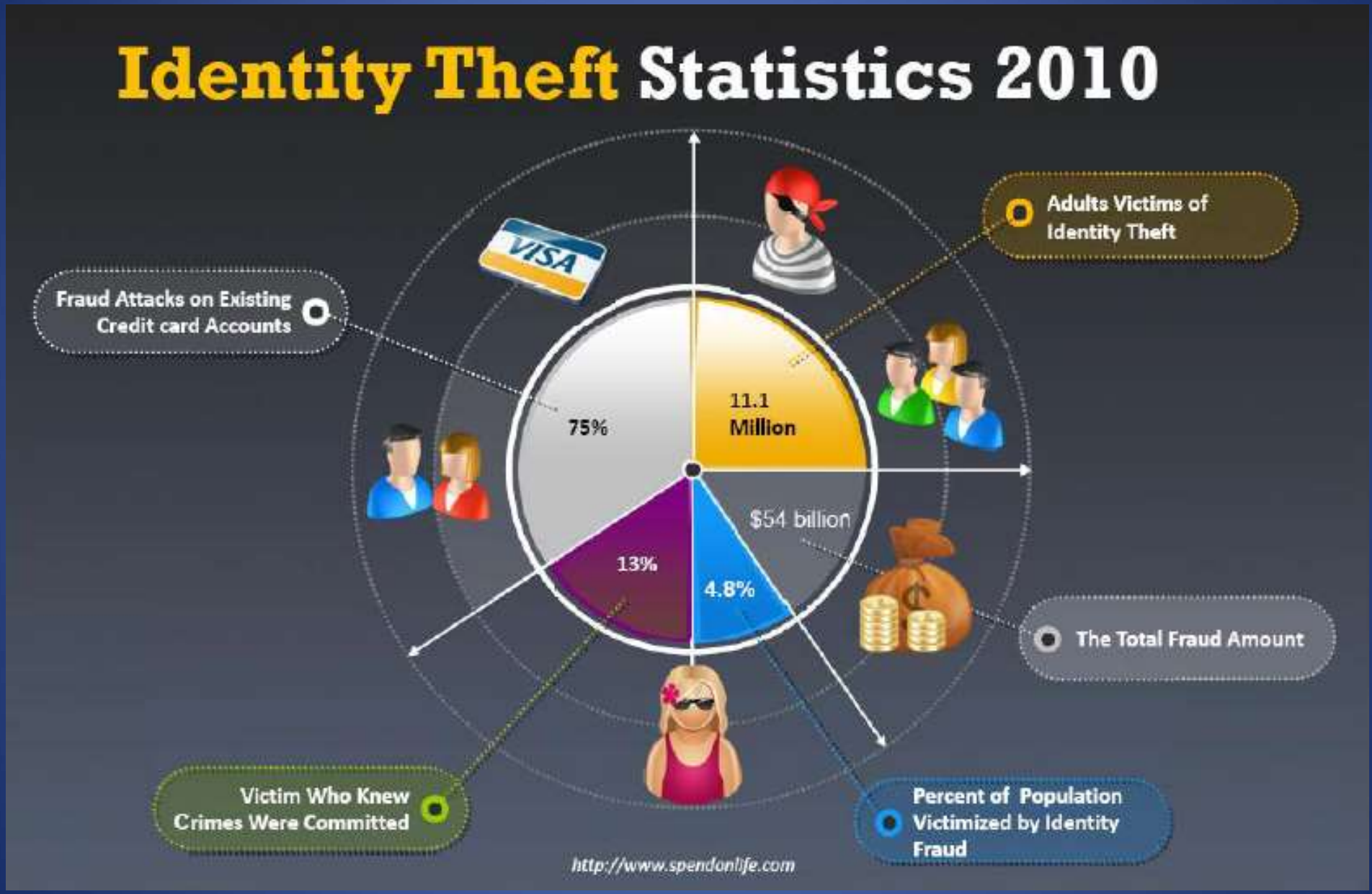
Social Engineering Through Impersonation on Social Networking Sites

Impersonation means **imitating** or copying the behavior or actions of others

Malicious users **gather confidential information** from social networking sites and create accounts in others' names

Attackers can also use collected information to carry out other forms of **social engineering attacks**

Attackers use others' profiles to create large networks of friends and **extract information** using social engineering techniques



Identify Theft

Theft of Personal Information

Identity theft occurs when someone steals your name and other personal information for fraudulent purposes

Identity Theft

Loss of Social Security Numbers

It is a crime in which an imposter obtains personal information, such as Social Security or driver's license numbers

Easy Methods

Cyberspace has made it easier for an identity thief to use the information for fraudulent purposes

"One bit of personal information is all someone needs to steal your identity"

Social Engineering Pen Testing

- The objective of social engineering pen testing is to **test the strength of human factors** in a security chain within the organization
- Social engineering pen testing is often used to **raise level of security awareness** among employees
- Tester should **demonstrate extreme care and professionalism** for social engineering pen test as it might involve legal issues such as violation of privacy and may result in an embarrassing situation for the organization

Demo XXV

Targeted phishing attack with Beef

Certificate Transparency

- https://www.censys.io/

Bug bounty

- https://hackerone.com/users/sign_up
- https://bugcrowd.com/user/sign_up
-
- https://bountyfactory.io/fr/index.html
-
- https://www.yogosha.com/
- https://www.bugbountyzone.com/

Spare

DDOS attack

- http://www.securityweek.com/ddos-hire-services-cheap-effective

A little game…

Find the intruder(s)…

Encrypt
(Encrypter)

Decipher
(Déchiffrer)

Cipher
(Chiffrer)

Decrypt
(Décrypter)

Chloé ! J'ai récupéré le disque dur des vilains terroristes ! Il me faut ces informations ! Vite!

Jack, il faudra que je décrypte le disque, c'est à dire que je « casse » leur code ! Ça va être très long !

Dammit Chloé ! On n'a pas le temps ! Ça va péter ! Que puis-je faire ?

Jack, si tu arrives à obtenir leur « clé de déchiffrement », je pourrai « déchiffrer » leur message et ce sera plus rapide que si je le décryptais !