CYBER WAR SIMULATION, TOOLS CHOOSING THE VICTIM CRITICAL INFRASTRUCTURE

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CHOOSING THE VICTIM CRITICAL INFRASTRUCTURE

Attacker

Infrastructure

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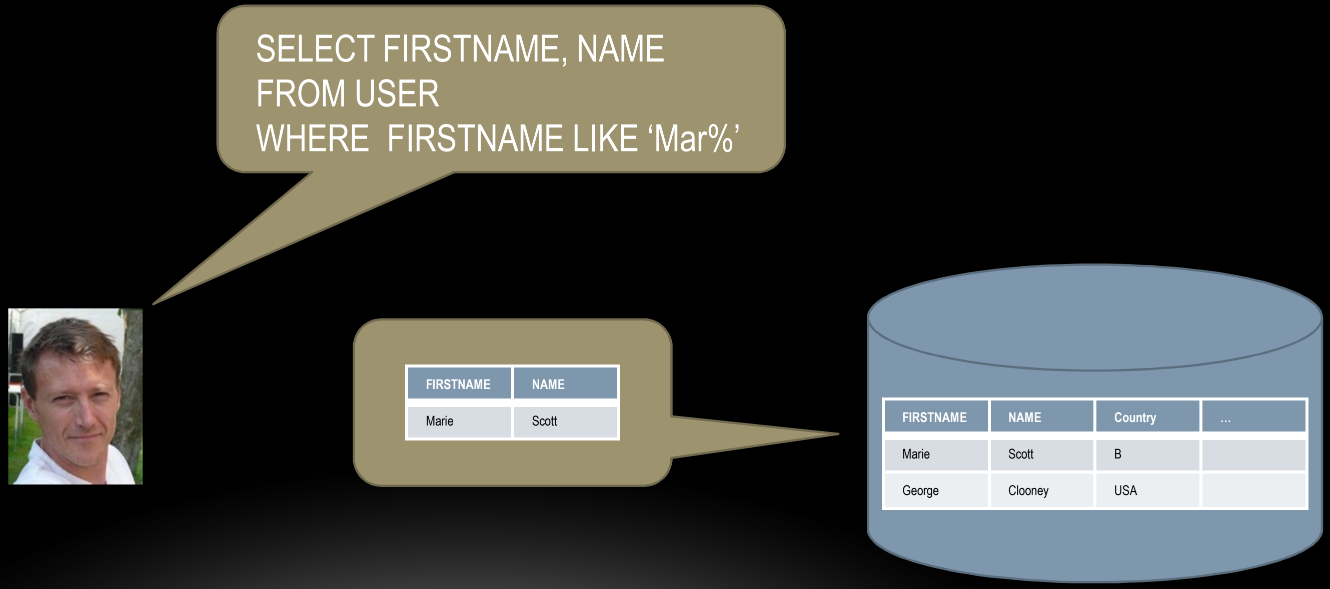
EXAMPLE OF VULNERABILITY

- Recent data breach in The Netherlands (23/4/2012)
  - http://www.dutchnews.nl/news/archives/2012/04/sensitive_medical_information.php
  - http://www.demorgen.be/dm/nl/993/Gezondheid/article/detail/1426278/2012/04/20/Medische-gegevens-300-000-Nederlanders-gelekt.dhtml
- Reason: SQL-attack
  - What is SQL-injection?

EXAMPLE OF VULNERABILITY

- Relational Database Management System
  - e.g. MySQL, Oracle, SQL Server,…
  - Communication with SQL (ANSI standard)



```
SELECT FIRSTNAME, NAME
FROM USER
WHERE  FIRSTNAME LIKE ‘Mar%’
```

FIRSTNAME	NAME
Marie	Scott

FIRSTNAME	NAME	Country	…
Marie	Scott	B	
George	Clooney	USA	

EXAMPLE OF VULNERABILITY

- Tool for communication with database
  - e.g. SQLyog for MySQL
  - We enter a SQL-statement and see the result in the tool
- Communication in a program via API
  - Let me show a very simple application
    - Existing username and correct password – I may enter
    - Non-existing username or wrong password – I may not enter

EXAMPLE OF VULNERABILITY

- Let me show and explain the code
  - username and password are entered via user interface and are hold in what an IT’er calls variables (value holders)
  - We construct a SQL-statement with those variables via concatenation

```
SELECT * FROM USER WHERE USERNAME = ‘
user1
‘ AND PASSWORD = ‘
p1
‘
```

EXAMPLE OF VULNERABILITY

- Let me show the vulnerability
- Let me explain the vulnerability
  - How could the “injection” happen?

```
SELECT * FROM USER WHERE USERNAME = ‘
admin
‘ AND PASSWORD = ‘
‘ OR ‘1’ = ‘1
‘
```

EXAMPLE OF VULNERABILITY

- It can even be worse

```
SELECT * FROM USER WHERE USERNAME = ‘
‘; DROP TABLE USER; --
‘ AND PASSWORD = ‘
‘
```

CHOOSING THE VICTIM CRITICAL INFRASTRUCTURE

- Choosing the victim
  Let’s think about the data breach in The Nederlands
  - Motivation (money, honor, harm, …)
  - Importance of victim (person versus company, enemy, …)
  - Infrastructure (up-to-date/out-dated, type, specialism, …)
  - Known vulnerabilities…
    - Database of vulnerabilities on operating systems, databases, services, standard applications
    - List of most dangerous software errors

CHOOSING THE VICTIM CRITICAL INFRASTRUCTURE

- If you know the type of infrastructure, operating system, platform, application, services you can check a vulnerability in one of the databases.
    - US National vulnerability database: http://nvd.nist.gov/
    - Vulnerability Notes Database of US-CERT http://www.kb.cert.org/vuls/
    - The open source vulnerability database http://www.osvdb.org/
    - …
- You can manually check the vulnerability and exploit it but that is cumbersome
- You can use a (specific) vulnerability scanner
    - Nessus, SATAN/SAINT/SARA, Nikto/Wikto, Nmap, OpenVAS, …

CHOOSING THE VICTIM CRITICAL INFRASTRUCTURE

- If you want to check the vulnerabilities of other non-standard applications
- Check the list of most dangerous software errors, but attack by hand can be cumbersome
  - http://www.sans.org/top25-software-errors/
- Automated tools for pentest
  - OWASP Zed Attack Proxy Project
  - Nikto/Wikto
  - …

RESOLUTION OF THE VULNERABILITY

- Let me test the vulnerability
- Let me solve the vulnerability
  - I have to use better API’s and programming practices
- Let me test if the vulnerability is solved

TRAINING AND GAMES ON VULNERABILITY

- Pentest training
  - Webgoat
    - Unsafe JavaEE app on Tomcat webserver
      - Install Apache Tomcat
      - Deploy the Java Web Archive
  - …
- Security games
  - UCSB International Capture The Flag http://ictf.cs.ucsb.edu/
  - Roothack http://www.roothack.org/
  - …

OTHER VULNERABILITIES

- If SQL injection problem is solved, is there still a way to enter the site?
  - Yes, I can send an e-mail in name of an official person asking to re-enter a password
    - I just can program it
    - I just need an SMTP-server (open relay)
  - I can always check if the password is not among the list of worst passwords
    http://techland.time.com/2011/11/22/the-25-most-popular-and-worst-passwords-of-2011/
    http://www.bmyers.com/public/1958.cfm
    1 out of 5 users uses one on this last list!

    Possibly the cause of the databreach!

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THANK YOU FOR YOUR ATTENTION