CEHv12 LAB SETUP GUIDE

# Overview

Use this guide to set up your lab for the CEHv12 activities. You will:

1. Prepare your host PC
2. Set up the virtual machines.

You have TWO options to set up the virtual machines. You can choose whichever is better for your environment:

* OPTION #1 – Download and use ready-made, pre-configured VMs
	+ Simpler
	+ Takes less time
	+ Requires more Internet bandwidth
* OPTION #2 – Manually build the VMs yourself
	+ More complex
	+ Takes longer
	+ Requires less Internet bandwidth

## Virtual Machines Overview

Your lab consists of six virtual machines (VMs) running on your host. Five are traditional VMware VMs, and the seventh is an Android emulator named BlueStacks. Please note that it is not necessary to run all VMs at the same time. Depending on the activity, you will be able to suspend or shut down one or more of the VMs to conserve host CPU and RAM resources.

# Prepare Your Host PC

## Host PC Minimum Requirements

Your Host PC must meet the following minimum requirements:

* Intel i5 CPU 64-bit
* 8 GB RAM (16 GB or more recommended)
* 150 GB Free Disk Space
* Windows 10 64-bit
* Camera
* High-speed Internet access

## Back Up Your PC

When working with hacking tools, there is always a chance that you could accidentally damage your operating system, apps, or data. Be sure to back up all important data to a removable drive or the cloud before you start.

## Uninstall Hyper-V

Microsoft Hyper-V is incompatible with VMware. If you have ever installed or used the Hyper-V feature on your Host PC, you will need to completely uninstall it, including editing your boot configuration data (BCD). To uninstall Hyper-V, follow these steps:

1. Search for and open Control Panel.
2. Click **Uninstall a program**.
3. Click **Turn Windows Features on or Off**.
4. Uncheck **Hyper-V** and click **OK**.
5. If prompted, reboot your PC, and then log back in.
6. Click **Start** 🡪 **Command Prompt**.
7. Right-click **Command Prompt** 🡪 **Run as administrator**. When prompted, click **Yes.**
8. Type the following command and press Enter:

bcdedit /set hypervisorlaunchtype off

1. Close the Command Prompt window.
2. If prompted, reboot and then log back in.

## Install Software on the Host PC

1. On your Host PC, download and perform a default installation of the following items IN THIS ORDER:
* Google Chrome 64-bit Standalone Installer

<https://archive.org/details/chrome-standalone-setup-64_202205>

* 7-zip

<https://www.7-zip.org/a/7z2107-x64.exe>

* VMware Workstation 17 Player

<https://www.vmware.com/go/getplayer-win>

* BlueStacks version 5 or later. Make sure you use the desktop version, not the BlueStacks X cloud version.

<https://www.bluestacks.com/download.html>

* Wireshark

<https://2.na.dl.wireshark.org/win64/Wireshark-win64-4.0.1.exe>

* Netcut

<https://arcai.com/download_netcut/>

1. Download the Flappy Bird Android app. Do not attempt to install it. You will use it later in an activity:

<https://d.apkpure.com/b/APK/bay.flappybird?version=latest>

# Set Up the Virtual Machines

To set up the virtual machines, choose **EITHER** Option #1 or #2.

# Option #1 – Download Pre-configured VMs

The six VMware VMs have been pre-configured and are ready to use. They are zipped up as 7-Zip self-extracting archives. Some are in multiple pieces. You will download them from two different Google Drives.

You will:

* Download 4 VMs from a Site A mirror
* Download 2 VMs from a Site B mirror
* Extract the VMs
* Open and test the VMs in VMware Workstation 17 Player

## Download Group A VMs

Download these 4 VMs from Site A:

* bee-box
* Kali-Linux-2022.2-vmware-amd64.vmwarevm
* metasploitable-linux-2.0.0
* Windows XP Professional

Site A download links:

You can download from any of the following three mirrors. You do not need an account to download:

<https://drive.google.com/drive/folders/1oQ8j53UwXEbu8FLIvl0sIDgHAH-BtJh0?usp=share_link>

<https://drive.google.com/drive/folders/1GadbMrxil9XbKw81pThZ7CEEHaAnXtZf?usp=share_link>

<https://drive.google.com/drive/folders/1SdAWvduT5ioSTCgn_AKFKOHciy1hXsQG?usp=share_link>

## Download Group B VM

Download these 2 VMs from Site B:

* Server2016
* W2k

Site B download links:

You can download from any of the following three mirrors. You do not need an account to download:

<https://drive.google.com/drive/folders/1V2wIFHvrRRry1FUBMUgr_bXUV43nSE-_?usp=share_link>

<https://drive.google.com/drive/folders/1D0tcKlCwK8s8nehMyNX8lTquaFSNED7H?usp=share_link>

<https://drive.google.com/drive/folders/1b62bE2kaUOYAu9ol03kLKuoEDW7WNaIk?usp=share_link>

## Extract the VMs

Once all parts of all six VMs have been downloaded, you will unzip them.

1. Locate and double-click **Kali-Linux-2022.2-vmware-amd64.vmwarevm.exe**.
2. In the 7-Zip self-extracting archive popup dialog box, click **Extract**.
3. Allow Kali Linux to extract into a folder of the same name.

Note: The extraction process will reassemble all of the Kali Linux pieces into a single VM.

1. Using the same technique, extract the other 5 VMs.

## Open the VMs in VMware Player

1. Double-click the **VMware Workstation 17 Player** launcher to start the app.
2. In Player, click **Open a Virtual Machine**.
3. Navigate into the **Kali-Linux-2022.2-vmware-amd64.vmwarevm** folder.
4. Select **Kali-Linux-2022.2-vmware-amd64** and click **Open**.
5. In the **VMware Workstation Player Library** (left pane), verify that you see the **Kali-Linux-2022.2-vmware-amd64** VM.

1. Click **Home**.
2. Using the same technique, open the other four VMs in VMware Workstation Player.

Note: For each VM, you will need to launch a new instance of Player.

1. Verify that you now see all six VMs in the VMware Player library.



## Test the VMs.

1. In Player, select **Server2016**.
2. Click **Play virtual machine**.
3. If you are prompted with a popup stating **This virtual machine might have been moved or copied**, click **I Copied It**.
4. Allow Server2016 to boot up.
5. When you see the splash screen, click the Send Ctrl+Alt+Del to virtual machine button .
6. Log in as ***Administrator*** with the password of ***Pa22w0rd!***
7. If the Server Manager Dashboard appears, you can close it.
8. Above the VM, click the **Suspend guest** button 
9. When prompted, click **Yes**.
10. Server2016 will go into suspended (paused) mode, and its window will close.
11. Using the same technique, launch, log into, suspend and close the other 5 VMs. See the following table for their usernames and passwords.

(Note: the actual order in which you start and stop the VMs is generally not important)

|  |  |  |
| --- | --- | --- |
| Virtual Machine | Username / Password | Comment |
| Server2016 | Administrator / Pa22w0rd! | none |
| Windows XP Professional | admin / password | none |
| Metasploitable2-Linux | msfadmin / msfadmin | Press Ctrl+Alt to release a trapped mouse |
| Kali-Linux-2022.2-vmware-amd64 | kali / kali | Linux is case-sensitive |
| bee-box v1.6 | n/a | AFTER you see the desktop, resize the VM if desired |
| W2k | Administrator / password | none |

Congratulations! Your CEHv12 lab is ready for use.

# Option #2 – Manually Build Your VMs

If you were unable or decided not to download pre-configured VMs, you can manually build them by following the steps in this section.

## Download VMs and ISOs

Download the following VMs and ISOs to your host PC. These will be used to create your lab.

Note: When downloading ISOs from archive.org, on the right side of the download page under **DOWNLOAD OPTIONS**, **select ISO IMAGE**.

* Kali Linux 2022.2 VM

<https://kali.download/virtual-images/kali-2022.2/kali-linux-2022.2-vmware-amd64.7z>

* Metasploitable 2 VM

<https://sourceforge.net/projects/metasploitable/files/latest/download>

* Bee-Box v1.6.7

<https://sourceforge.net/projects/bwapp/files/bee-box/bee-box_v1.6.7z/download>

* Windows Server 2016 Datacenter ISO

<https://go.microsoft.com/fwlink/p/?LinkID=2195174&clcid=0x409&culture=en-us&country=US>

Alternate download site for Windows Server 2016:

<https://archive.org/details/windows-server-2016-datacenter-eval-en-us-14393-refresh_202205>

* Windows XP Pro with Service Pack 2 ISO

<https://archive.org/download/xp_pro_w_sp2_slipstreamed/xp_pro_w_sp2_slipstreamed.iso>

* Windows 2000 Advanced Server

<https://archive.org/details/w-2k-adv-server-eval>

* W2kSP3 KB835732 WMwareTools Combo

<https://archive.org/details/w-2k-sp-3-kb-835732-vmware-tools-combo>

* Microsoft SQL Server 2000 Developer Edition

<https://archive.org/details/microsoft-sql-server-2000-developer-edition-2000-iso.-7z>

* juggybankDB\_vulnapp.zip

<https://archive.org/details/juggybankDB_vulnapp>

## Install Server 2016

1. Double-click the **VMware Workstation 17 Player** launcher to start the app.



1. Click **Player** 🡪 **File** 🡪 **New Virtual Machine.**
2. Select **I will install the operating system later** and click **Next.**
3. Select the **Microsoft Windows** radio button, and in the **Version** dropdown box select **Windows Server 2016**, then click **Next.**
4. Change the **Virtual machine name** to ***Server2016*** and then click **Next.**
5. On the **Specify Disk Capacity** page, click **Next.**
6. **Click Finish**. You should see Windows Server 2016 appear in the VMware library (left pane).
7. Make sure the VM is selected, then click **Edit virtual machine settings**.
8. On the **Hardware** tab, select **CD/DVD (SATA)**
9. Under **Connection**, click **Use ISO image file**, then click **Browse**.
10. Navigate to **Windows\_Server\_2016\_Datacenter\_EVAL\_en-us\_14393\_refresh.ISO**, select it, and click **Open**.
11. Back on the **Hardware** tab, ensure that **Connect at power on** is checked, then click **OK**.
12. Click **Play virtual machine**.
13. If prompted about Removable Devices, click **OK**.
14. When prompted to **Press any key to boot from CD or DVD**, press Enter on your keyboard.

Note: If you missed the prompt, click the Send Ctrl+Alt+Del button at the top of the VM.

Note: During installation, your mouse might get “trapped” in the VM. Press Ctrl+Alt on your keyboard to release it.

1. On the **Windows Setup** page, accept the defaults and click **Next**.
2. Click **Install now**.
3. On the **Select the operating system you want to install** page, select **Windows Server 2016 Standard Evaluation (Desktop Experience)** and then click **Next**.
4. Accept the license terms and click **Next**.
5. Click **Custom: Install Windows only (advanced)**.
6. Click **Next**.
7. Click **Next** again.
8. Allow Windows to install. This should take several minutes, depending on the speed of your host computer. Note: if prompted to install VMware tools, ignore the prompt.
9. On the **Customize settings** page, for the Administrator account, enter and reenter ***Pa22w0rd!*** as the password (that’s a zero, not a capital O), then click **Finish**. You should see the Windows logon screen.

### Prepare Server 2016

You will configure Server 2016 and install hacking tools on it.

#### Log into Server 2016

1. Above the VM logon screen, click the Ctrl+Alt+Del button 
2. In the Administrator password field, type ***Pa22w0rd!*** and click **Enter.**
3. If prompted **Do you want to allow your PC to be discoverable by other PCs and devices…** click **Yes**.
4. Below the VM, in the VMware Tools banner, click **Install Tools**.
5. Click the **DVD Drive (D:) VMware Tools** popup.
6. In the **DVD Drive (D:) VMware Tools** window, click **Run setup64.exe**.
7. In the **VMware Tools Setup** wizard, click **Next** twice, then click **Install**.
8. Click **Finish**.
9. Click **Yes**, and allow Server2016 to restart.

#### Rename the Server:

1. Log back into Server2016.
2. If necessary, start Server Manager:
	1. Click **Start** 🡪 **Server Manager**.
3. In the **Server Manager Dashboard**, on the left pane click **Local Server**.
4. In the **PROPERTIES** pane, to the right of **Computer name**, click the link (the current computer name).
5. In the **System Properties**, in the **Computer Name** tab, click the **Change** button.
6. Change the Computer name to **Server2016** and click **OK**.
7. When prompted to restart the computer, click **OK**.
8. Click **Close**.
9. In the **You must restart your computer to apply these changes** dialog box, click **Restart Later**.

#### Enable SMBv1:

1. With the Command Prompt still open, enter the following command:

DISM /Online /Enable-Feature /All /FeatureName:SMB1Protocol

1. Restart the VM.
	1. Click **Start** 🡪 power button  🡪 **Restart** 🡪 **Continue**.
2. Allow the VM to restart.

#### Turn off Windows Firewall

1. Log in to Server2016 as **Administrator** / **Pa22w0rd!**
2. If necessary, close **Server Manager**.
3. On the left side of the Task bar, next to the Start button, click Search Windows .
4. In the **Search Windows** field, type ***Windows firewall***.
5. In the **Best match** results, click **Windows Firewall**.



The Windows Firewall app should open.

1. On the left, click **Turn Windows Firewall on or off**.
2. Under both Private and Public network settings, change the setting to Turn off Windows Firewall (not recommended).



1. Click **OK**.
2. Close the Windows Firewall window.

#### Disable Windows Security features:

1. Click the Start button 🡪 Settings 
2. Click **Update & security**.
3. Click **Windows Update**.
4. If you are prompted to install any updates, ignore the prompt.
5. Under **Update settings**, click **Advanced options**.
6. Check the **Defer feature updates** checkbox.
7. In the upper left corner of the Settings window, click the back button (left arrow).
8. Click **Windows Defender**.
9. Turn off:
	* + Real-time protection
		+ Cloud-based Protection
		+ Automatic sample submission
		+ Enhanced notifications
10. Under **Exclusions**, click **Add an exclusion**.
11. Click **Exclude a folder**.
12. In the **Select Folder** dialog box, click **This PC**, then click **Local Disk (C:)**
13. Ensure that **Local Disk (C:)** is selected as the folder, then click **Exclude this folder**.
14. Close the **Settings** window.

### Disable Windows Updates

1. At the desktop, click Start, type ***Edit group policy***, and in the **Best match** open **Edit group policy.**
2. In the **Local Group Policy Editor**, navigate into **Local Computer Policy\Computer Configuration\Administrative Templates\Windows Components\Windows Update**.
3. Locate and double-click **Configure Automatic Updates**.
4. Change the setting to **Disabled** and click **OK**.
5. Close the **Local Group Policy Editor**.

### Add Hacking Tools to Server 2016

1. Switch to your Host PC.
2. Locate the Google Chrome standalone installer that you downloaded earlier.
3. Drag and drop the Google Chrome installer to the Server2016 desktop.
4. Switch to Server2016.
5. Perform a default installation of Google Chrome browser from the installer you just put on the Server2016 desktop.
6. In Server2016, use Google Chrome to download CEHv12 Hacking Tools (WINDOWS EXECUTABLE) from:

<https://archive.org/details/cehv-12-tools_20221123_0215>

1. Once the download is complete, double-click **CEHv12\_Tools.exe** to unzip the hacking tools.
2. If prompted, click **Run**.
3. Click **Extract**.
4. Navigate into the **CEHv12\_Tools** folder.
5. It should have three subfolders:



1. Navigate into the **Install on Server 2016** folder.
2. You should see 24 tools (some are in folders):



1. Navigate into **Colasoft Packer Builder** folder, double-click **pktbuilder\_2.0.0.212.exe**, and perform a default installation. Note that the other folders contain standalone executables that do not require installation.
2. Perform a default installation of each of the following (in the order shown). If any of the tools open up after installation, you can close them.
* httrack\_x64-3.49.2.exe
* Hyena\_English\_x64.exe
* ipscan-3.8.2-setup.exe
* Wireshark-win64-3.6.5.exe
* kfsens40.msi
* lc7setup\_v7.2.0\_Win64.exe
* nmap-7.92-setup.exe
	+ Note: If prompted to replace Npcap with a lower version, click **No**.
* putty-64bit-0.78-installer.msi
* QS12Setup
* wde.exe

Note: idserve.exe and LOIC.exe are standalone executables that do not require installation. You also do not need to explicitly install npcap-1.60.exe.

You will install and configure MailEnable, and then Thunderbird, next.

### Install the Email System on Server 2016

Server2016 is the email server for your lab.

#### Add IIS to Server Features

The email server includes a webmail service. You will need to install the IIS web server on Server2016.

1. In Server2016, click **Start** 🡪 **Server Manager**.
2. Click **Add roles and features**.
3. Click **Next** three times.
4. On the **Select server roles** page, check the **Web Server (IIS)** checkbox.
5. Click **Add Features**
6. Click **Next** four times.
7. Click **Install**.
8. Allow the feature to install. When finished, click **Close**.
9. Close **Server Manager**.

#### Install MailEnable Standard Email Server

1. In Server2016 **Downloads\ CEHv12\_Tools\ Install on Server 2016\** locate and double-click **standard1043**.
2. Click **Run**.
3. Click **OK** twice.
4. Click **Next**.
5. On the **Get Installation Settings** page, for the **Name** and **Company**, enter anything you like.
6. Click **Next** six times.
7. On the **Get Postoffice Details** page, change the Post Office Name to ***EXAMPLE.TEST***, and change the Password to ***1Password***
8. Click **Next**.
9. Click **Next** again.
10. On the **SMTP Connector Configuration** page, for the **Domain Name** enter ***example.test*** and click **Next**.
11. Click **Next** again, and allow the installation to run.
12. On the **Select WebMail Web Root** page, click **Next**.
13. On the **Select Web Administration Web Root** page, click **Next**.
14. Allow the installation to complete. This may take a few minutes.
15. Click **Finish**.
16. A browser will attempt to open to the MailEnable website. Close it (you may have to click **Close** several times before you can close the browser).
17. Restart Server2016, then log back in again as ***Administrator*** / ***Pa22w0rd!***

#### Configure MailEnable SMTP Settings

1. In Server2016, click **Start** 🡪 **Mail Enable** 🡪 **MailEnable**. The **MailEnableAdmin** tool opens.
2. In the navigation pane on the left, under **MainEnable Management**, expand **Servers** 🡪 **localhost** 🡪 **Services and Connectors**.
3. Select and then right-click **SMTP** 🡪 **Properties**.
4. On the **General** tab, ensure that the **Local domain name** and **Default mail domain name** display ***example.test***
5. Check the **Enable PLAIN authentication** checkbox.



1. Click **Apply**.
2. In the popup warning, click **OK**.
3. Switch to the **Inbound** tab.
4. Ensure that **Inbound IP Bindings** is set to **Always bind the service to all available IP addresses**.
5. Ensure that **Allow IPv6 client connectivity** is checked.



1. Click **OK**.
2. Right-click **SMTP** 🡪 **Stop**.
3. Wait a few seconds.
4. Right-click **SMTP** 🡪 **Start**.

#### Configure MailEnable IMAP Settings

1. In the **MailEnableAdmin**, under **Services and Connectors**, select then right-click **IMAP** 🡪 **Properties**.
2. In the **General** tab, ensure that **Always bind the service to all available IP addresses** is selected.
3. Ensure that the **Allow IPv6 client connectivity** checkbox is checked.



1. Switch to the **Settings** tab.
2. Uncheck **Enable CRAM-MD5 authentication**.
3. Ensure that **Enable PLAIN authentication** is checked.



1. Click **OK**.
2. Right-click **IMAP** 🡪 **Stop**.
3. Wait a few seconds.
4. Right-click **IMAP** 🡪 **Start**.

#### Create Mailboxes

1. In **MailEnableAdmin**, under **MailEnable Management**, expand **Messaging Manager** 🡪 **Post Offices** 🡪 **EXAMPLE.TEST**.
2. Click **Mailboxes**.
3. Verify that you see the **Postmaster** mailbox in the middle pane.
4. In the **Actions** pane on the right, click **New Mailbox…**
5. In the **Mailbox Name**: field, enter ***moo***
6. In the **Password**: field, enter ***1Password***
7. Click **OK**.
8. Ensure that you now also see a ***moo*** mailbox.
9. Using the same technique, add one or two more mailboxes with names of your choice. To avoid confusion, use the same password of ***1Password***

Note: In this case, mailbox user accounts are not integrated with Windows accounts. You can create email users without having to also create Windows users.



1. Minimize **MailEnableAdmin**.

#### Configure Email Clients

Install and configure the Thunderbird email client for at least two of the mailboxes you created.

1. In the **CEHv12\_Tools\Install on Server 2016\** folder, locate and double-click **Thunderbird Setup 102.5.0.exe.**
2. When the setup wizard opens, click **Next**.
3. Click **Next** again.
4. Click **Install**.
5. Click **Finish**.
6. On the **Account Setup** page, in the **Your full name** text field, enter ***Moo***
7. In the **Email address** text field, enter ***moo@example.test***
8. In the **Password** field, enter ***1Password***



1. Click **Configure manually**.
2. In the **INCOMING SERVER** section, ensure that these values are entered:
* Protocol: **IMAP**
* Hostname: **server2016**
* Port: **143**
* Connection security: **None**
* Authentication method: **Normal password**
* Username: **moo@example.test**
1. In the **OUTGOING SERVER** section, ensure that these values are entered:
* Hostname: <Server2016 IP address>
* Port: **25**
* Connection security: **None**
* Authentication method: **Normal password**
* Username: **moo@example.test**



1. Click **Done**.
2. A popup Warning! window will appear, notifying you that the incoming and outgoing settings do not use encryption. Check the **I understand the risks** checkbox, and click **Confirm**.
3. Click **Finish**.
4. In Moo’s **Inbox**, verify that you see a **New E-Mail Account Notification** email.
5. In the **Folders** pane on the left, select **moo@example.test**.
6. In the middle pane, under **Set Up Another Account**, click **Email**.
7. Using the same technique you used for moo, configure the settings for at least one of your other email users. Except for the Full name, Email address and Username, use the same values that you used for Moo.
8. When finished, verify that you see inboxes for the users you just configured.

Note: If you don’t see the mailboxes, in the upper left corner of Thunderbird click the Mail icon. 



### Test the Email System

1. Create and send some test emails between the users to ensure that the system works.

Note: when specifying a recipient, you will need to enter their entire email address, not just the user’s name. For example: **moo@example.test**.

### Practice Managing the Server2016 VM

Along with Kali Linux, you will use Server2016 in most of your activities. If you have never used VMware Workstation before, you should get comfortable managing the VMs.

#### Pause (Suspend) and Un-pause the VM

You can pause a VM when you don’t need to use it for a while. This preserves the VM in its current state, including running processes. At the same time, it frees up all host CPU and RAM resources that the VM is currently using. You can un-pause the VM at any time, and can even reboot your host when the VM is in a paused state.

1. In the upper-left corner of the VM, above the guest OS desktop, locate and click the Pause button.



1. When prompted **Are you sure you want to suspend the virtual machine and exit?**, click **Yes**. The VM window closes and you can safely continue to use or even reboot your computer.
2. To un-pause the VM, double-click the VMware Workstation 17 Player icon:

 

1. In the VMware library, select **Server2016**. Verify that the **State** is **Suspended**.
2. **Click Play virtual machine**.
3. When the VM has resumed, you can continue using it where you previously left off.

### Finish Installing Server2016

1. In Server2016, close any open windows.
2. Leave Server2016 running, as you will need it during the installation of Kali Linux.

## Install Kali Linux

### Open the Kali Linux VM

1. Locate the Kali Linux download.
2. Right-click **kali-linux-2022.2-vmware-amd64.7z** 🡪 **7-zip** 🡪 **Extract here**. Allow the extraction to finish.
3. Verify that you now have a folder named **Kali-Linux-2022.2-vmware-amd64.vmwarevm**.
4. Launch a new instance of **VMware Workstation 17 Player**.
5. Click **Open a Virtual Machine**.
6. Navigate into the **Kali-Linux-2022.2-vmware-amd64.vmwarevm** folder.
7. Select **Kali-Linux-2022.2-vmware-amd64** and click **Open**.
8. In the VMware Workstation Player library (left pane), verify that you see the Kali Linux VM.



1. Ensure that the Kali VM is selected, then click **Play virtual machine**.
2. When prompted, click **I Copied It**.
3. If prompted about removable devices, click **OK**.
4. Allow Kali to boot up.
5. At the login screen, in both the username and password fields, enter ***kali*** and then click **Log In**.

### Enable the Kali root account

1. Above the Kali desktop, in the upper left, click the **Terminal Emulator** launcher. A terminal window opens.



1. In the terminal window, type the following command and then press Enter:

(Note: Linux commands are case-sensitive)

sudo passwd root

1. When prompted for the password for kali, type ***kali*** and then press Enter.
2. When prompted for **New password**, type ***kali*** and then press Enter.
3. When prompted, retype ***kali*** and press Enter.

### Install Thunderbird on Kali

1. Above the Kali desktop, in the upper right corner, click the Logout button , then click **Log Out**.
2. At the login prompt, log in as ***root*** with the password of ***kali***.
3. At the desktop, open a terminal.
4. In the terminal window, enter the following command:

sudo apt update && apt upgrade

1. After a moment, the update will pause and prompt you **Do you want to continue?** Type ***Y*** and press Enter.
2. Allow the update and upgrade to continue. This will take a few minutes.
3. When prompted to restart services without asking, press Tab to select **Yes** and then press Enter.
4. Allow the upgrade to continue.
5. If prompted about obsolete major version 14 of postgresql, press Tab to select **OK**, then press Enter.
6. The upgrade continues.
7. When the upgrade is finished, enter this command:

apt install thunderbird

1. When prompted do you want to continue, enter ***Y***
2. Allow Thunderbird to finish installing.
3. Log out of Kali.
	1. In the upper right, above the Kali desktop, click the **Log Out** button.
4. Click **Log Out**.
5. Log back into Kali as ***kali*** with the password of ***kali***.
6. In the upper left corner above the desktop, click the Applications launcher.



1. Click **Usual Applications** 🡪 **Internet** 🡪 **Thunderbird**.



1. Just as you did in Server2016, set up a mailbox on Kali for Moo:
* Your full name: **Moo**
* Email address: **moo@example.test**
* Password: **1Password**

Click **Configure manually**

**INCOMING SERVER**

* Protocol: **IMAP**
* Hostname: **server2016**
* Port: **143**
* Connection security: **None**
* Authentication method: **Normal password**
* Username: **moo@example.test**

**OUTGOING SERVER**

* Hostname: **server2016**
* Port: **25**
* Connection security: **None**
* Authentication method: **Normal password**
* Username: **moo@example.test**
1. Open Moo’s Inbox.
2. Verify that you see the email correspondence with the other user(s).
3. Send a test reply and ensure that it is successfully sent.

### Finish Installing Kali Linux

1. Close all open windows.
2. In **VMware Player**, click the **Suspend guest** button  to pause Kali. Allow the VM to close.
3. Similarly, pause the Server2016 VM. It too will close.

## Install Metasploitable

Note: Keep in mind that Metasploitable has no GUI. You must type all commands, and they are case sensitive. Additionally, VMware Tools will not install in the OS. The VM will capture your mouse. Press Ctrl+Alt to release your mouse. If you want to type in Metasploitable, click into the command prompt window first before typing.

### Open Metasploitable in VMware Player

1. Browse to your downloads and locate **metasploitable-linux-2.0.0.zip**.
2. Right-click the zip file 🡪 **Extract All** 🡪 **Extract**.
3. Using the technique you recently learned, open **Metasploitable** in a new instance of VMware Player.
4. Play the virtual machine.
5. When prompted, click **I Copied It**.
6. If prompted about removable devices, click **OK**.
7. Start Metasploitable.
8. If the VMware Tools banner appears at the bottom of the VM, click **Never Remind Me**.

### Correct Configuration Error

Metasploitable 2 shipped with a configuration error. You will manually correct this.

1. At the **metasploitable login:** prompt, click into the command prompt. Then type ***msfadmin*** and press Enter.
2. At the **Password:** prompt, again type ***msfadmin*** and press Enter.
3. Verify that you have logged in successfully.
4. Enter the following command:

sudo nano /var/www/mutillidae/config.inc

1. When prompted for the password, enter ***msfadmin***
2. Using the arrow keys on your keyboard to navigate, and the backspace key to erase, replace ‘metasploit’ with ‘owasp10’.



1. Press Ctrl+o
2. Press Enter
3. Press Ctrl+x
4. Verify that the correction was successful by entering this command:

cat /var/www/mutillidae/config.inc

### Configure FTP Bounce Vulnerability

1. Navigate into /etc directory with this command:

cd /etc

1. Open vsftpd.conf with this command:

sudo nano vsftpd.conf

1. Press your keyboard down arrow until you reach the end of the file.
2. Add the following lines at the end:

# Make server susceptible to FTP Bounce Attack

pasv\_promiscuous=YES

port\_promiscuous=YES



1. Press Ctrl+o
2. Press Enter
3. Press Ctrl+x
4. Press Enter

### Finish installing Metasploitable

1. In VMware Player, suspend Metasploitable and allow the VM to close.

Metasploitable is now ready for use.

Note: Here are the commands if you ever wish to shut down or reboot Metasploitable:

Shut down: sudo init 0

 Reboot: sudo init 6

When prompted for the password, enter ***msfadmin***

## Install Bee-Box

1. Locate and right-click **bee-box\_v1.6.7z 🡪 7-Zip 🡪 Extract Here**.
2. Open **bee-box** in VMware Player.
3. Start bee-box.
4. Click **I Copied It**.
5. Click OK to removable devices.
6. Allow bee-box to boot up.

Note: the bee-box VM will automatically fill your screen. You can resize it AFTER it is fully booted and you see the desktop. In the upper-right corner of the VM, click the **Restore Down** button  to resize its window to be smaller.

Note: you might need to grab and drag the lower right corner of the VM to make it slightly larger. This will allow you to see entire windows without having to scroll inside the VM.

### Change the Bee-Box Keyboard to US English

Bee-box uses a Belgian keyboard by default. You will change this.

1. At the top of the bee-box VM, click **System** 🡪 **Preferences** 🡪 **Keyboard**.



1. Switch to the **Layouts** tab.
2. Click **+ Add**
3. Change the **Layouts:** dropdown box to **USA**.
4. Click **+ Add**.
5. Change the **Default** layout to **USA**.



### Finish Installing Bee-Box

1. In bee-box, close any open windows.
2. In VMware Player, suspend bee-box and allow the VM to close.

## Install Windows XP

1. In VMware Workstation Player, create a new VM with these choices:
* I will install the operating system later.
* Microsoft Windows – Windows XP Professional
1. In the Windows XP Professional VM Settings, set the CD/DVD to use **xp\_pro\_w\_sp2\_slipstreamed.iso**, and start the VM.
2. At the **Welcome to Setup** page, press Enter.
3. At the **Windows XP Licensing Agreement page**, Press F8
4. At the partition page, press Enter.
5. Press Enter again.
6. Allow XP to install.
7. In the GUI stage, at the **Regional and Language Options** page, click Next.
8. At the **Personalize Your Software** page, for the **Name** and **Organization**, enter anything you like and click Next.
9. At the **Your Product Key** page enter ***H36CC-HFBHM-FVY9Q-VFPVC-4H9VG*** and click **Next**.
10. At the **Computer Name** **and Administrator Password** page, enter the following information:
* Computer name: ***XP-PRO***
* Administrator password: ***password***
* Confirm password: ***password***
1. Click **Next**.
2. At the **Date and Time Settings** page, click **Next**.
3. Click **Next** two more times.
4. In the **Display Settings** popup box, click **OK**.
5. In the **Monitor Settings** popup box, click **OK**.
6. On the **Welcome to Microsoft Windows** page, click **Next**.
7. On the **Help protect your PC** page, click **Not right now**, then click **Next**.
8. On the Internet connection page, click **Next**.
9. On the **Ready to register with Microsoft** page, select **No, not at this time**, and then click **Next**.
10. On the **Who will use this computer?** page, in **Your name:** enter ***admin*** then click **Next**.
11. Click **Finish**.

### Configure XP-PRO

1. At the XP desktop, click **start** 🡪 **Control Panel**.
2. Click **Switch to Classic View**.
3. Open **Administrative Tools** 🡪 **Local Security Policy** 🡪 **Local Policies** 🡪 **Security Options**.
4. Locate the policy **Network access: Sharing and security model for local accounts**.
5. Double-click the policy and change the setting to: **Classic – local users authenticate as themselves.**
6. Click **OK**.
7. Close the **Local Security Settings**.
8. Close the **Administrative Tools**.
9. Open a command prompt:
	1. Click **Start** 🡪 **Run**
	2. Enter ***cmd*** and then click **OK**.
	3. Type the following command and then press Enter:

net user admin password

1. Test the password:
	1. Click **Start** 🡪 **Log Off** 🡪 **Log Off**
	2. In the login screen for admin, type ***password*** and then press Enter.
	3. Verify that you obtain a desktop.

### Install Hacking Tools on XP-PRO

1. Switch to your Host PC.
2. Start the Server2016 VM.
3. Switch back to XP-PRO.
4. Create the C:\Tools folder in XP-PRO.
	1. In XP-PRO, click **start** 🡪 **My Computer**
	2. Double-click **Local Disk (C:)**
5. Click **Show the contents of this folder**
6. Once in the **C:** drive, click **File** 🡪 **New** 🡪 **Folder**
7. Rename the folder to **Tools**
8. Click **Start** 🡪 **Run**
9. In the **Run** line, type ***\\Server2016\C$*** and press Enter.
10. In the **Connect to Server2016** dialog box, enter:
* User name: ***Administrator***
* Password: ***Pa22w0rd!***
1. Click **OK**.
2. In the **\\server2016\c$** window, navigate into **Users\Administrator\Downloads\CEHv12\_Tools\Install on XP\**



1. Copy the four files into **C:\Tools\**
2. Close the window to **\\server2016\c$**
3. In **C:\Tools**, perform a default installation of **AdbeRdr812\_en\_US**.
4. Install Internet Explorer 8:
	1. Double-click **IE8-WindowsXP-x86-ENU**.
	2. On the **Welcome to Windows Internet Explorer 8** page, select **I want to help improve Internet Explorer** and then click **Next**.
	3. Click **I accept**.
	4. Uncheck **Install updates** and click **Next**.
	5. Click **Restart now (recommended)**.
	6. Allow XP-PRO to restart.
	7. Log in as **admin** / ***password***
	8. If necessary, navigate back into **C:\Tools**
5. Unzip Valhala honeypot:
	1. Right-click **valhala180-english.zip** 🡪 **Extract All**
	2. Click **Next** twice.
	3. Click **Finish**.
	4. Verify that you see the honeypot.



1. In **C:\Tools**, unzip **prorat\_v1.9**
2. When prompted for a password, enter ***pro***
3. Allow the extraction to complete and click **Finish**.

### Finish Installing XP-PRO

1. In XP-PRO, close any open windows.
2. In VMware Player, suspend XP-PRO, and allow the VM to close.

Congratulations! Your CEHv12 lab is set up and ready to use.

## Install Windows 2000 Advanced Server

### Start the OS Installation

1. In VMware Workstation Player, create a new VM with these choices:
* I will install the operating system later.
* Microsoft Windows – Windows 2000 Advanced Server
* Virtual machine name: W2k
1. In the **Windows 2000 Advanced Server Settings**, set the **CD/DVD** to use **W2kAdvServerEval.iso**, and start the VM.
2. At the **Windows 2000 Server Setup** page, click into the page and press Enter.
3. At the **Welcome to Setup** page, press Enter.
4. At the next page, press **C.**
5. At the licensing page, press F8.
6. At the partitions page, press C.
7. At the partition size page, press Enter.
8. At the next page, press Enter again.
9. At the format partition page, use the down arrow key to select **Format the partition using the FAT file system**, and then press Enter.
10. Press Enter again, and allow the installation to run.

### Complete the OS Installation

The rest of the installation is GUI-based.

1. At the **Regional Settings** page, click **Next**.
2. At the **Personalize Your Software** page, enter any name and organization you wish, and click **Next**.
3. At the **Your Product Key** page, enter ***RBDC9-VTRC8-D7972-J97JY-PRVMG*** and click **Next**.
4. At the **Licensing Modes** page, click **Next**.
5. At the **Computer Name and Administrator Password** page, enter the following and click **Next**:
* Computer name: ***W2K***
* Administrator password: ***password***
1. Click **Next** four more times.
2. At the evaluation copy popup warning, click **OK**.
3. At the **Date/Time Properties** page, ensure that the date and time are correct and click **OK**.
4. Click **Finish**.
5. When the installation is finished, at the login screen, log in as ***administrator*** / ***password***.
6. At the desktop, the **Configure Your Server** page opens. Select **I will configure this server later**, and then click **Next**.
7. Uncheck **Show this screen at startup**, and then close the window.

### Install Service Pack 3, Hotfix, and VMware Tools

1. In the W2k VM **Settings**, change the **CD/DVD** ISO to **W2kSP3\_KB835732\_VMwareTools\_Combo.iso.**
2. 2. In **Device status**, ensure that the **Connected** checkbox is checked, then click **OK**.
3. At the login screen, press the Ctrl+Alt+Del button. 
4. In the **Administrator** password field enter ***password*** and click **OK**.
5. On the desktop, open **My Computer**.
6. Double-click **ISO Label (D:)** to open it.
7. Perform a default installation of the three executables on the CD in the following order. You will have to reboot W2k after installing each:
	1. W2ksp3
	2. KB835732-x8-enu
	3. Win2k\_VMwareToolsUpgrader

Note: If after installing VMWareToolsUpgrader the VM freezes upon reboot, attempt to close the VM window. You will get error messages, but the VM should unfreeze and continue its reboot.

### Increase the Screen Resolution and VM size

1. Log into W2k as ***administrator*** / ***password***.
2. Right-click the desktop 🡪 **Properties**.
3. In the **Display Properties**, switch to the **Settings** tab.
4. Verify that **Colors** is set to **True Color (32 bit)**.
5. Change the **Screen area** to a higher resolution such as 1024 x 768.
6. Click **Apply**, then click **OK**, then click **Yes**, then click **OK** again.

### Install Microsoft SQL Server 2000 Developer Edition

1. In the W2k VM **Settings**, change the **CD/DVD** ISO to **Microsoft SQL Server 2000 Developer Edition\disk01.iso.**
2. Start W2k and log in as ***administrator*** / ***password***.
3. Open **My Computer**.
4. Double-click **SQL2000\_DEV (D:)**
5. Locate and double-click **autorun.**



1. Click **SQL Server 2000 Components.**
2. Click Install Database Server.
3. At the Welcome page click **Next**.
4. Click **Next** three more times.
5. Click **Yes**.
6. In the **CD-Key** page, enter ***H9P9T-J7CB2-362P4-WJ3FG-9FT73*** and then click **Next**.
7. Click **Next** three more times.
8. At the **Services Accounts** page, select **Use the Local System account** and then click **Next**.
9. At the **Authentication Mode** page, select **Mixed Mode (Windows Authentication and SQL Server Authentication)**.
10. Check the **Blank Password (not recommended)** checkbox and then click **Next**.
11. Click **Next** again.
12. Allow the installation to run.
13. At the **Setup Complete** page, click **Finish**.

### Install the Juggybank Database

1. In the Wk2 VM window, click **Player** 🡪 **Manage** 🡪 **Virtual Machine Settings**.
2. In the W2k VM **Settings**, change the **CD/DVD** ISO to **juggybankDB\_vulnapp.iso**, uncheck **Connected**, then click **OK**.
3. Reopen the VM **Settings**, select **CD/DVD**, check **Connected**, and then click **OK**.
4. Open **My Computer**.
5. Open **ISO Label (D:).**
6. Verify that you see the **vulnapp** folder, and **juggybank\_backup**.
7. Copy the **vulnapp** folder and **juggybank\_backup** to **C:\Inetpub**.



1. In W2k, click **Start** 🡪 **Programs** 🡪 **Microsoft SQL Server** 🡪 **Enterprise Manager**.
2. In **SQL Server Enterprise Manager**, under **Console Root**, expand **Microsoft SQL Servers 🡪 SQL Server Group**.
3. Expand **W2K** **(Windows NT).** Allow it a moment to initialize and expand.
4. When it expands, right-click **Databases** 🡪 **All Tasks** 🡪 **Restore Database.**
5. On the **General** tab, in the **Restore:** section, select **From device**.
6. In the **Restore as database:** text box, change master to ***juggybank*** (you will have to type the name).
7. Click the **Select Devices** button.
8. Click **Add**.
9. In the **Choose Restore Destination** page, ensure that the **File name:** radio button is selected, then click the browse button **…**
10. Browse to and select **C:\Inetpub\juggybank\_backup**, then click **OK**.
11. Click OK again.
12. Ensure that **Restore from Disk** is selected, with the **Device name C:\Inetpub\juggybank\_backup**.



1. Click **OK** three times.
2. Verify that you see **juggybank** amongst the other databases. If necessary, click the Refresh button 



1. Minimize **SQL Server Enterprise Manager**.

### Connect Vulnapp to IIS

1. In W2k, click **Start** 🡪 **Settings** 🡪 **Control Panel** 🡪 **Administrative Tools**.
2. Double-click **Internet Services Manager**.
3. Under **Internet Information Services**, expand **wk2**.
4. Select and right-click **Default Web Site** 🡪 **New** 🡪 **Virtual Directory**.
5. In the **Virtual Directory Creation Wizard** click **Next**.
6. On the **Virtual Directory Alias** page, in the **Alias:** text box, type ***bankapp*** and click **Next**.
7. On the **Web Site Content Directory** page, browse into **C:\Inetpub**, select the **vulnapp** folder, and click **OK**.
8. Click **Next**.
9. On the **Access Permissions** page, ensure that **Read**, **Run scripts**, and **Execute** are all checked, and click **Next**.
10. Click **Finish**.
11. Close **Internet Information Services** manager.
12. In **Administrative Tools**, double-click **Data Sources (ODBC)**.
13. In the **ODBC Data Source Administrator**, switch to the **System DSN** tab.
14. Click **Add…**
15. Scroll down and select **SQL Server**.



1. Click **Finish**.
2. On the next page, enter or select the following:

Name: ***juggybank***

Description: ***juggybank database***

Server: **W2K**



1. On the next page, select **With SQL Server authentication using a login ID and password entered by the user**.
2. Ensure that the **Connect to SQL Server to obtain default settings for the additional configuration options** checkbox is checked.
3. In the **Login ID:** field, type ***sa***
4. Leave the Password field blank and then click **Next**.



1. On the next page, check the **Change the default database to**: checkbox, and select **juggybank**.
2. Click **Next** twice.
3. Click **Test Data Source**.
4. Verify that the **TESTS COMPLETED SUCCESSFULLY** and then click **OK**.
5. Click **OK** two more times.
6. Close **Administrative Tools**.

### Test the Database

1. Switch to your Host PC.
2. Open a browser to <http://W2k/bankapp/client2.htm>
3. Ensure that you see the **Welcome to JuggyBank** page.



1. Scroll down and log in as ***haja*** / ***haja***
2. Verify that you see a customer record.



### Finish Installing W2k

1. In W2k, close any open windows.
2. In VMware Player, suspend W2k, and allow the VM to close.

Congratulations! Your lab setup is complete and ready to use!

# Troubleshooting

Follow these guides to troubleshoot the most common problems associated with your lab.

## Mouse keeps getting trapped in a VM

This happens because VMWare Tools have not been successfully installed in the VM. Perform or keep in mind the following:

* After you install the operating system, install VMware Tools in the VM:
	1. Click **Player** 🡪 **Manage** 🡪 **Install VMware Tools.**
	2. Follow the wizard to perform a default installation.
	3. Restart the VM if prompted.
* If you click your mouse into a VM and it is trapped, press Ctrl+Alt to release it.
* You cannot install VMware Tools in Metasploitable, since it has no GUI.
* If you have already installed VMware Tools in a VM, but the mouse becomes trapped again, reinstall the Tools in that OS, choosing **Repair**.

## You must click an object multiple times in a VM before it opens, or before you can type

As you switch back and forth between VMs, or between a VM and your Host PC, it’s easy to lose track of which window has focus.

1. Click into the desired VM once before attempting to select anything inside of it. If you are trying to type a command in the VM, click inside its command prompt before typing.

## How to Shut Down or Reboot Metasploitable

There may be times when it becomes necessary to shut down or restart Metasploitable. This can especially happen if you have performed an exploit against the VM.

* Command to shut down: sudo init 0
* Command to reboot: sudo init 6

When prompted for the password, enter ***msfadmin***

Allow the VM to finish the shutdown / restart process.

## VMware Player prompts you to Take Ownership of a VM

This happens when you already have the VM running in another window, or when the VM is in a suspended state. Check your Host PC Taskbar carefully for other running instances of that VM. Be sure to only open one instance of each VM.

## Virtual Machine does not start

This most often happens when the VM is already running, and you try to open it again, OR its files were copied while they were still locked.

Symptoms:

* Your virtual machine does not start.
* You cannot boot your virtual machine.
* You see one of these errors:
	+ Cannot open the disk or one of the snapshot disks it depends on.
	+ Failed to lock the file.
	+ The virtual machine is already powered on.

To fix the problem:

1. Ensure that the VM is not already running.
2. Navigate into the VM folder.
3. Delete any file or folder that has a **.lck** extension.
4. Start up the VM.

## Virtual Machine freezes / becomes unresponsive

Occasionally, VMware Player may lose its connection to a running virtual machine.

1. If the VM does not respond at all, simply close its window.
2. If prompted to shut down, allow Player to shut the machine down.
3. Reopen / run the machine again in Player.

## Problems resizing Bee-box VM

When you start the bee-box VM, you will often see VMware Player’s Menu Bar overlayed on top of the bee-box Menu Bar:



1. Drag the corners of the VM to make it smaller.
2. Ensure that the Player menu bar is now it is proper place:



1. You should now be able to toggle the VM normally between Minimize, Resize, and Close.

## Bee-box Displays Strange or Unexpected Characters When You Type

Bee-box uses a Belgian keyboard by default. During setup, you changed the default Keyboard Indicator to USA. Unfortunately, you may still get strange or unexpected characters when you type.

1. To fix the problem, locate the Keyboard Indicator button in the center of the desktop Menu Bar. Toggle it from **USA** to **Bel** (or back) as needed.



## Verify XP-PRO is activated

1. In XP-PRO, click **Start** 🡪 **Command Prompt**.
2. Type ***cd c:\windows\system32\oobe*** and then press Enter.
3. Then type ***msoobe /a*** and press Enter.
4. In the **Windows Product Activation** window, verify that Windows is already activated.
5. Close the **Activate Windows** window.

## Verify when W2k evaluation period expires

Unfortunately, the Windows 2000 evaluation period cannot be extended. You will have to create a new W2k VM every 180 days to continue using it. Follow these steps to determine when the evaluation period will expire:

1. At the W2k desktop, click **Start** 🡪 **Ru**n.
2. In the **Run** line, type ***winver*** and press Enter.
3. In the **About Windows** popup window, locate and examine the **Evaluation copy** expiration date.
4. Close the **About Windows** window.

## Extend Activation Period for Server2016

You can extend the 180-day activation period for Windows Server 2016 evaluation copy up to six times, for a total of 3 years (180 days \* 6 = 3 years).

Note: Wait until the Windows License is expired or near expiration before reactivating.

1. In Server2016, click the Start window and then start typing ***Command Prompt***.
2. In the **Best match** results, right-click **Command Prompt** 🡪 **Run as administrator**.
3. In the Command Prompt, type or paste the following command, then press Enter:

cscript.exe %windir%\system32\slmgr.vbs /dlv

1. At the bottom of the results, verify that you still have at least one remaining Windows rearm count.
2. Enter the following:

cscript.exe %windir%\system32\slmgr.vbs /rearm

1. Close the Command Prompt.

# Alternate Tools Download Sites

The tools in CEH\_v12\_Tools.iso can also be obtained from their original sources. Be sure to disable any antivirus or real-time protection before you download these tools.

* 7-zip

<https://www.7-zip.org/a/7z2107-x64.exe>

* Adobe Acrobat Reader v8.1.2

<https://archive.org/details/adbe-rdr-812-en-us>

* Angry IP Scanner

<https://github.com/angryip/ipscan/releases/download/3.8.2/ipscan-3.8.2-setup.exe>

* Bluestacks 5

<https://www.bluestacks.com/download.html>

* Cain & Abel

[https://web.archive.org/web/20160214132154/http://www.oxid.it/downloads/ca\_setup.exe](https://web.archive.org/web/20160214132154/http%3A//www.oxid.it/downloads/ca_setup.exe)

* Colasoft Packet Builder

<https://www.colasoft.com/download/products/download_packet_builder.php>

* Facebook Lite APK

<https://archive.org/details/facebook-lite-v-305.0.0.12.106-apkpure.com>

* FOCA

<https://foca.en.softonic.com/download>

* Google Chrome 64-bit Standalone Installer

<https://archive.org/details/chrome-standalone-setup-64_202205>

* High Orbit Ion Cannon (HOIC)

[https://sourceforge.net/projects/highorbitioncannon](https://sourceforge.net/projects/highorbitioncannon/)

* HTTrack

<https://www.httrack.com/page/2/en/index.html>

* Hyena x64 (trial)

<https://www.systemtools.com/hyena/trial_download.htm>

* ID Serve

<https://www.grc.com/files/idserve.exe>

* Internet Explorer 8 (IE8)

<https://archive.org/details/ie-8-windows-xp-x-86-enu_202211>

* KFSensor (trial)

<http://www.keyfocus.net/kfsensor/download/kfsens40.msi>

* L0phtCrack7

<https://l0phtcrack.gitlab.io/releases/7.2.0/lc7setup_v7.2.0_Win64.exe>

* Low Orbit Ion Cannon (LOIC)

[https://sourceforge.net/projects/loic](https://sourceforge.net/projects/loic/)

* MailEnable Standard Edition

<https://www.mailenable.com/download-thank-you.asp?prod=1&v=1043>

* Netcat for Windows

<https://archive.org/details/nc111nt>

* Netcut

<https://arcai.com/download_netcut/>

* Nmap for Windows

(Note: Be sure to obtain both Nmap-7.92-setup.exe AND npcap-1.60.exe)

<https://nmap.org/download.html#windows>

* ophcrack

<https://sourceforge.net/projects/ophcrack/>

* ProRat 1.9

<https://prorat.software.informer.com/download/>

* PuTTY

<https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html>

* Pwdump7

<https://www.tarasco.org/security/pwdump_7/>

* QuickStego

<https://download.cnet.com/QuickStego/3000-2092_4-75593140.html>

* Snow (snwdos32.zip)

<http://darkside.com.au/snow/>

* SoftPerfect Network Scanner (Windows portable 8.1.4)

<https://www.softperfect.com/download/files/netscan_portable.zip>

* Thunderbird Email Client

<https://www.thunderbird.net/en-US/download/>

* Valhala Honeypot 1.8 English Edition

<https://sourceforge.net/projects/valhalahoneypot/>

* VMware Workstation 16 Player

<https://www.vmware.com/go/getplayer-win>

* Web Data Extractor 8.3

<http://www.webextractor.com/download.htm>

* Wireshark (Windows Installer 64 bit)

<https://www.wireshark.org/download.html>

~ finish ~