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**USC CSci530**  
**Computer Security Systems**  
**Lab notes Fall 2022**

**Dr. Clifford Neuman**  
**University of Southern California**  
**Information Sciences Institute**

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# **CSci530: Security Systems**

## **Week 1 Lab Notes – August 26, 2022**

### **Lab Introduction**

**Dr. Clifford Neuman**  
**University of Southern California**  
**Information Sciences Institute**

**<http://ccss.usc.edu/530>**

# Relationship to CSci530

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- **Class home page**  
**<http://ccss.usc.edu/530>**
- **Lab Component of Class**
  - **10 Labs during Semester**
  - **Grade based on 8 best scores**
  - **Labs graded Pass, High Pass, Low Pass and Fail**

# Lab Lecture Component

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- **4:30 – 5:20 in OHE and online**
  - **Lab Lectures are recorded**
  - **Purpose is to provide you with guidance for the lab you will perform in the following week.**
  - **For the lab component it is acceptable to view the “lectures” asynchronously.**

# Hands on Lab Component

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- Through 2019 we required most students to visit our instructional lab in OHE to use equipment established for the lab during one of several sessions assigned to groups of students. Some labs were performed online using the DETER Computer Security Testbed at USC-ISI.
- Clearly, in-person lab instruction was not possible in Fall of 2020 because of COVID, so last year we converted most lab exercises to VirtualBox and you can now perform those exercises using your home machines.
- Different exercises run on different Virtual machines, and we will describe the requirements and how to run the exercises in the Lab Lecture components each week.
- This week is a broad overview. There is no lab assigned for the coming week. Next weeks lab “lecture” will describe the first assigned lab on “cryptography”

# Virtual Box Configuration

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- Like last semester, you will use VirtualBox to configure the virtual machines used in your lab exercises.
- The instructions provide the VirtualBox commands to configure the machines you need, set up addresses and interconnections, etc.
  - A series of scripts will be provide for each exercise you will perform.
  - Some exercise on Fedora, others on Kali Linux and we will provide the VM's that you will load and run.

# M1 Macs and Other Platforms

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- Unfortunately, VirtualBox does not run on the newer M1 Macs, and you might have difficulty using it on certain other older machines.
  - For students that do not have their own machines capable of running VirtualBox, it may be possible to check out a laptop for the semester from the Viterbi Engineering Computer Center.
  - This should be the approach of last resort, as I expect there may be limited in the number of loaner laptops that are available.
  - If you have access to a lab machine on which you can load VirtualBox, that might be the best approach. Alternatively, if you have a friend or roommate that has a system that supports VirtualBox, using their machine for the several labs that require VirtualBox may also work.

More information is available here:

<https://viterbiit.usc.edu/services/engineering-computing-center/> (see the tab for Long Term Loaner Laptops).

You might start the process of obtaining a loaner laptop with a message to [engrhel@usc.edu](mailto:engrhel@usc.edu).

# Lab Exercise Weekly Topics

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- Cryptography/Key Management
- Authentication
- Authorization
- Application Security
- Packet Sniffing
- Firewalls
- Intrusion Detection
- ARP Spoofing
- Tunnels & VPN's
- Filesystem Labeling

Separate Instruction Pages will be added to the CSci530 website for each week's lab, starting With Cryptography next Friday (for you to perform before September 10<sup>th</sup>).



# Tentative Lab Schedule

Topic	Lecture Date	Due Date
Introduction	8/26	
Cryptography	9/2	9/16
Authentication	9/9	9/23
Authorization	9/16	9/30
Application Security	9/23	10/12
Packet Sniffing	10/7	10/21
Firewalls	10/21	11/4
Intrusion Detection	10/28	11/11
ARP Spoofing	11/4	11/18
Tunnels & VPNs	11/11	12/2
Filesystem Labeling	11/18	12/2

# Lab Exercise Mechanics

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- Like last semester, you will use VirtualBox to configure the virtual machines used in your lab exercises.
- The instructions provide the VirtualBox commands to configure the machines you need, set up addresses and interconnections, etc.
  - A series of scripts will be provided for each exercise you will perform.
  - Some exercise on Fedora, others on Kali Linux, some on CentOS and we will provide the VM's that you will load and run.

# Lab Platform

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- **VirtualBox**
  - How do I get Virtual Box?
- **Several VMs will be distributed**
  - What VMs are there?
  - How do I get the VMs?
  - How do I import the VMs into VirtualBox

# How do I get VirtualBox

- [www.virtualbox.org/wiki/Downloads](http://www.virtualbox.org/wiki/Downloads)



The screenshot shows the VirtualBox website's download page. The page has a blue header with the VirtualBox logo and the word "VirtualBox" in large blue letters. Below the header is a section titled "Download VirtualBox". The page contains several sections of text and links. A red circle highlights the "VirtualBox 6.1.26 platform packages" section, which lists four options: "Windows hosts", "OS X hosts", "Linux distributions", "Solaris hosts", and "Solaris 11 IPS hosts". The "Linux distributions" link is the one being pointed to by the red circle. Other sections include "VirtualBox binaries", "VirtualBox 6.1.26 Oracle VM VirtualBox Extension Pack", and "VirtualBox 6.1.26 Software Developer Kit (SDK)".

**VirtualBox**

## Download VirtualBox

Here you will find links to VirtualBox binaries and its source code.

### VirtualBox binaries

By downloading, you agree to the terms and conditions of the respective license.

If you're looking for the latest VirtualBox 6.0 packages, see [VirtualBox 6.0 builds](#). Please also use version 6.0 if you need to run VMs with

If you're looking for the latest VirtualBox 5.2 packages, see [VirtualBox 5.2 builds](#). Please also use version 5.2 if you still need support for

### VirtualBox 6.1.26 platform packages

- [Windows hosts](#)
- [OS X hosts](#)
- [Linux distributions](#)
- [Solaris hosts](#)
- [Solaris 11 IPS hosts](#)

The binaries are released under the terms of the GPL version 2.

See the [changelog](#) for what has changed.

You might want to compare the checksums to verify the integrity of downloaded packages. *The SHA256 checksums should be favored a*

- [SHA256 checksums, MD5 checksums](#)

**Note:** After upgrading VirtualBox it is recommended to upgrade the guest additions as well.

### VirtualBox 6.1.26 Oracle VM VirtualBox Extension Pack

- [All supported platforms](#)

Support for USB 2.0 and USB 3.0 devices, VirtualBox RDP, disk encryption, NVMe and PXE boot for Intel cards. See [this chapter from the VirtualBox Personal Use and Evaluation License \(PUEL\)](#). Please install the same version extension pack as your installed version of Virtual

### VirtualBox 6.1.26 Software Developer Kit (SDK)

- [All platforms](#)

# What VMs are there?

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- There will be 3 or 4 of them
  - In the form of .ova files
  - Ova files are large
  - I will spit them into smaller fragments for download
  - You will combine the fragments post download
- The first of these will be posted by Monday
  - Others will follow as needed for subsequent labs
- For some labs you will run multiple instances of a Virtual Machine. Scripts and detailed instructions to do this will be provided in the instructions associated with each lab assignment.

# Which Labs use Which VMs

Topic	VMs used
Cryptography	May be done on laptop
Authentication	(tba/tbd)
Authorization	Fedora30-fall20
Application Security	
Stack overflow	CentOS 4.3 min-gdb
Heartbleed	(tba/tbd)
C sign extension	Fedora30-fall20
Packet Sniffing	Fedora30-fall20
Firewalls	Fedora30-fall20
Intrusion Detections	CentOS 4.3 min-gdb
ARP Spoofing	Fedora30-fall20
Tunnels and VPNs	Fedora30-fall20
Filesystem labeling	(tba/tbd)

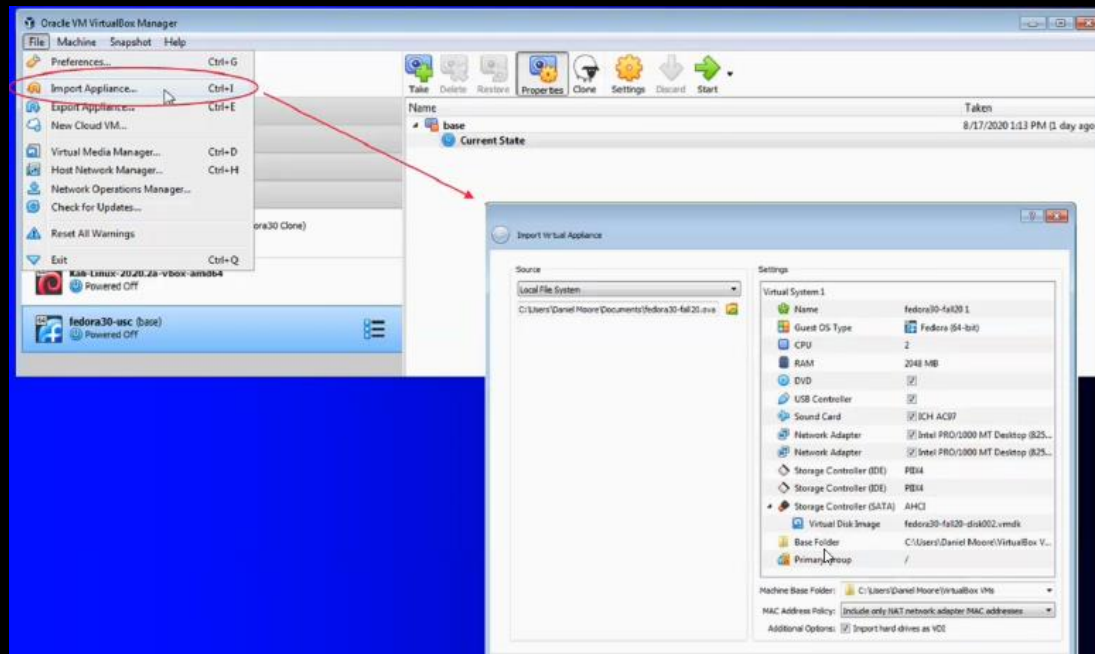
# How do I get the VMs

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- The VM's will be made available using USC's Google drive, and links will be distributed with the lab assignment instructions which will be posted in D2L and on the course webpage.

# How do I import the VMs to VirtualBox

- Per the detailed instructions that will be provided with each lab, you will download the OVA fragments and combine them, yielding an OVA files (approx. 5 or 6GB).
- You then “import appliance” into the Virtual Box Manager.





# Some Configuration Scripts

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- **Virtualbox includes “vboxmanage” command**
  - **A command line equivalent for GUI features**
- **We will provide short scripts that use vboxmanage to automate VM setup work for you.**
  - **To create VMs**
  - **To make settings (virtual cabling, ips, hostnames)**
  - **To power the on and off**
  - **To destroy them**
- **Because your lab is to perform functions using the VM’s, not to configure the VMs.**

# Where to get the lab scripts

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- There are 10 labs
- Each set of scripts will be in their own directory for a particular lab, obtainable through Google drive, per the instructions for the individual assignment
  - There are two sets, “.bat” for windows, and .sh (bash) for Linux/Apple. These are functionally equivalent.
  - Each set will likely have 4 to 6 scripts for different functions, e.g.:
    - Populate
    - ConstructNetwork (optional)
    - InternalSettings (optional)
    - Poweron
    - Poweroff
    - Destroy

# Your tasks for Next Week

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- We want you to familiarize yourself with the basic infrastructure for the labs, absent the individual instructions for the specific labs. Thus:
  - Download and install virtual box
  - By Monday we will make one appliance available for download, and you should download that appliance and provision it into VirtualBox.
  - You will download some relevant scripts for your platform (Windows, Linux or Apple).
  - We have posted instructions for the cryptography lab already, but that lab will not require the use of Virtualbox. The following Lab will be posted by the end of next week, and that lab will require the use of VirtualBox.